

ALL THE NEWS AND VIEWS IT'S POSSIBLE TO SQUEEZE INTO 68 PAGES

COMPUTER EXPRESS

FIRST NEWS • FIRST REVIEWS • BEST BUYS • YOUR WEEKLY GUIDE

THIS WEEK

AMIGA

Now you can upgrade your A500 to an A2000 complete with expansion slots

ATARI

The new ATOnce PC board supports VGA and will let you run several 'virtual' STs!

PC

Talking Pages! — how a new program makes WordPerfect and Lotus 1-2-3 speak to you

MACINTOSH

Apple's £350 bubble-jet printer sensation!

GAMERS

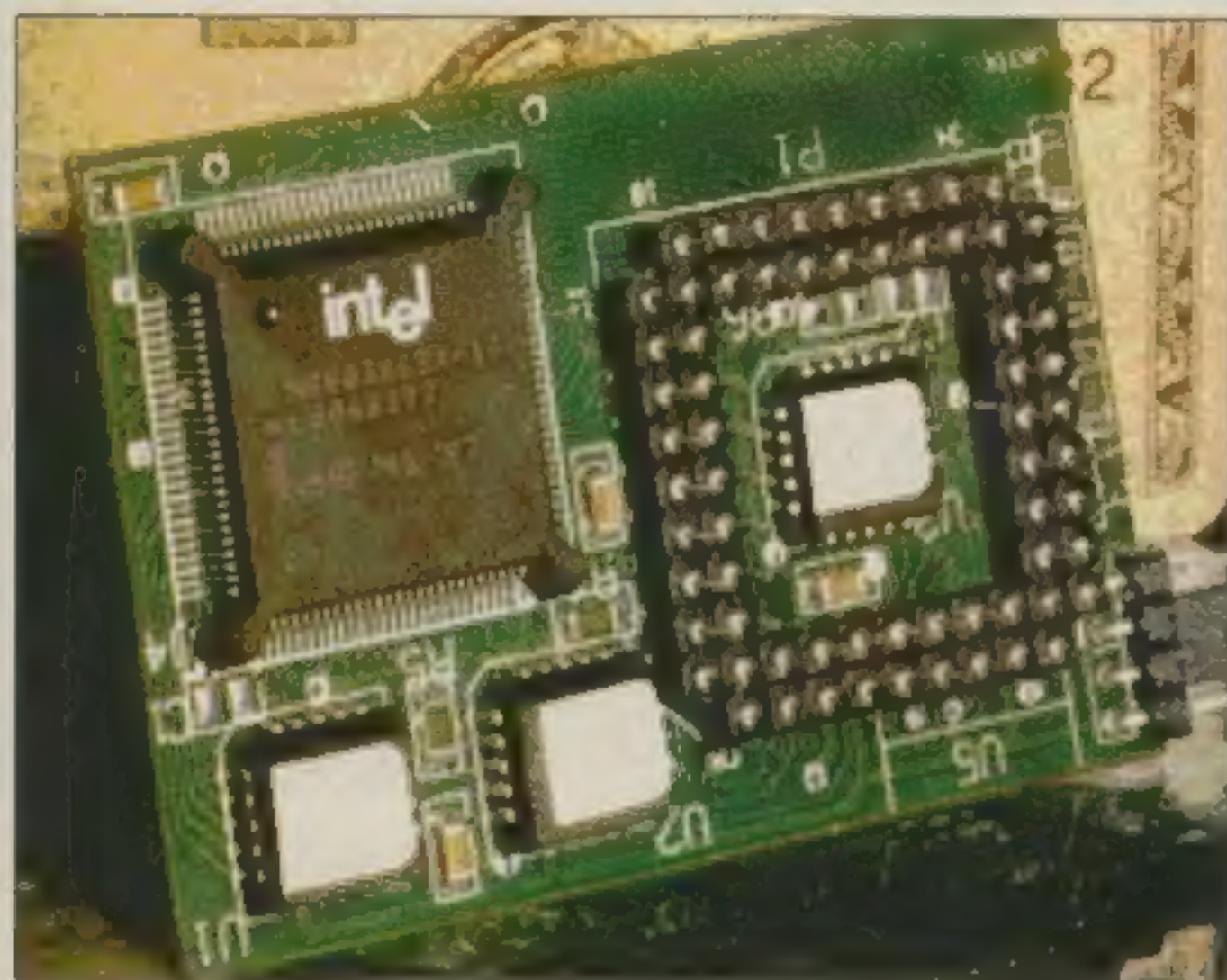
REGULAR TIPS
& TRICKS FOR
MEGADRIVE
NINTENDO
ATARI LYNX
GX-4000
& 44 PAGES OF

SHOPPING
EXPRESS

BARGAINS!!!

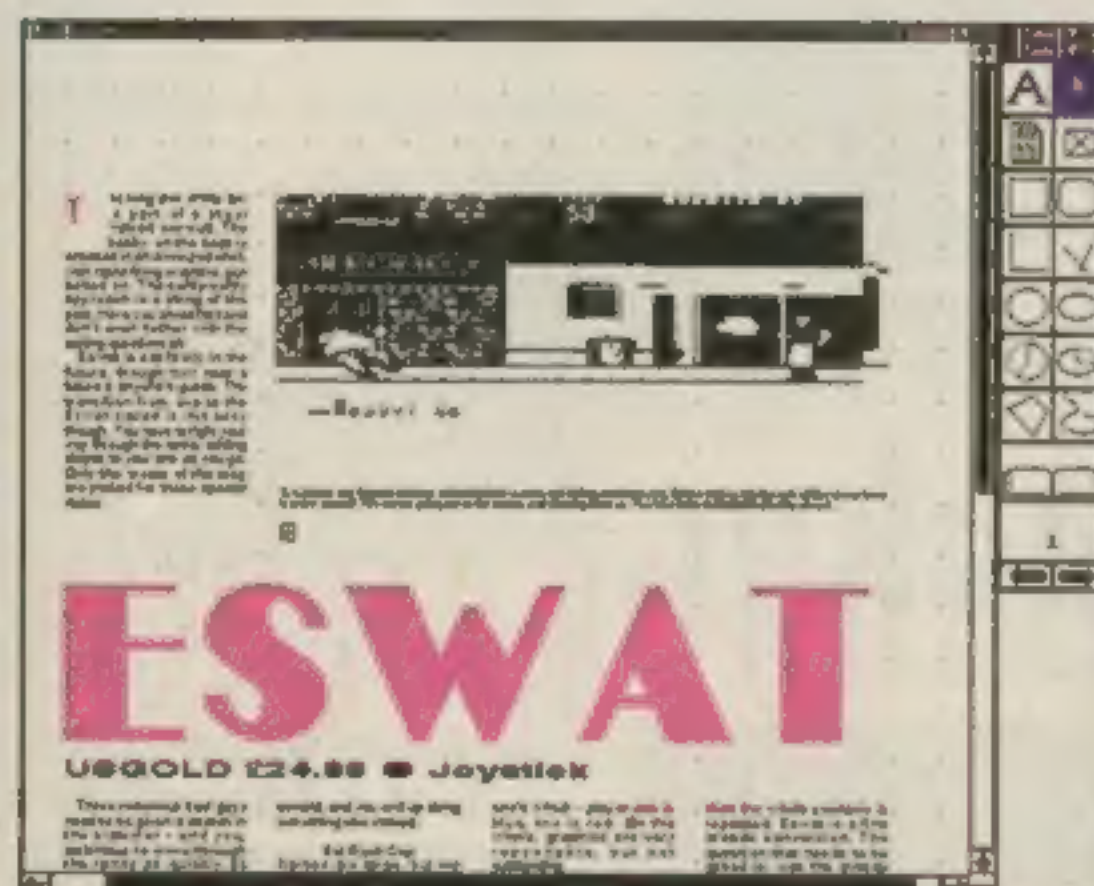
ATARI'S STE: **EXCLUSIVE!** £100 CHEAPER

The end of the STFM is nigh — see page 5



HAVE YOU WASTED YOUR MONEY ON A 286?

— What you should do now



PAGESTREAM 2

Is this the new King
of Amiga DTP?



21st Century tank warfare
blasts its way to the ST & Amiga

WHAT EVER HAPPENED TO OS/2?

Will Windows dominate tomorrow's PC world?



frontend

edited by Colin Campbell

DELL BOYS IN AD SCRAP



Compaq has slapped a writ on PC competitor Dell for running a comparative advertising campaign which sought to prove that Dell computers offers a better deal than Compaq.

Compaq is not claiming damages for the ads – which have been running since 1987 – but is seeking to prevent Dell publishing them again. Dell has pledged that it will fight the writ calling it “groundless and completely without merit”.

Chairman Michael Dell commented: “We have been running advertising comparing our PCs with those of Compaq since 1987. Scores of impartial reviews have for years run head to head comparisons of our computers and Compaq’s, finding Dell’s lower priced products equivalent, and often superior, in price performance and quality.”

The law states that comparative advertising is legal in this country so long as the comparison is fair and accurate. Dell’s ads usually feature Dell and Compaq computers side by side with equivalent technical specifications, but with differing prices.

Mr. Dell, never one to shy away from publicity, went on: “We find it strange that Compaq has chosen to issue a writ only now, when we have become larger and

more of a competitive threat. We stand behind the truth in our advertising.” ■

£30 video camera on silicon chip

Cinematic technology has come a fair old way since the days of Eisenstein and D W Griffiths.

You may have smugly thought the same yourself as you invested in that Camcorder. Well get this:

Scientists at Edinburgh University have invented a video camera which could fit onto a twenty pence piece. In fact, all

the standard components of a camera have been fitted onto a silicon chip.

The camera is located at the centre of the chip, and is made up of 84,000 light sensitive pixels able to produce a fully composite video signal.

The developers reckon they can develop a video camera with a retail tag of £30. ■

Computer in the scrum



England's Rugby Union has computerised its records system in an attempt to get the most detailed information on their players and the opposition.

As England attempts to win the Grand Slam, the union has invested £200,000 on the system. The Unix based computer can run the organisational affairs of the union, as well as being able to help out with tactics. ■

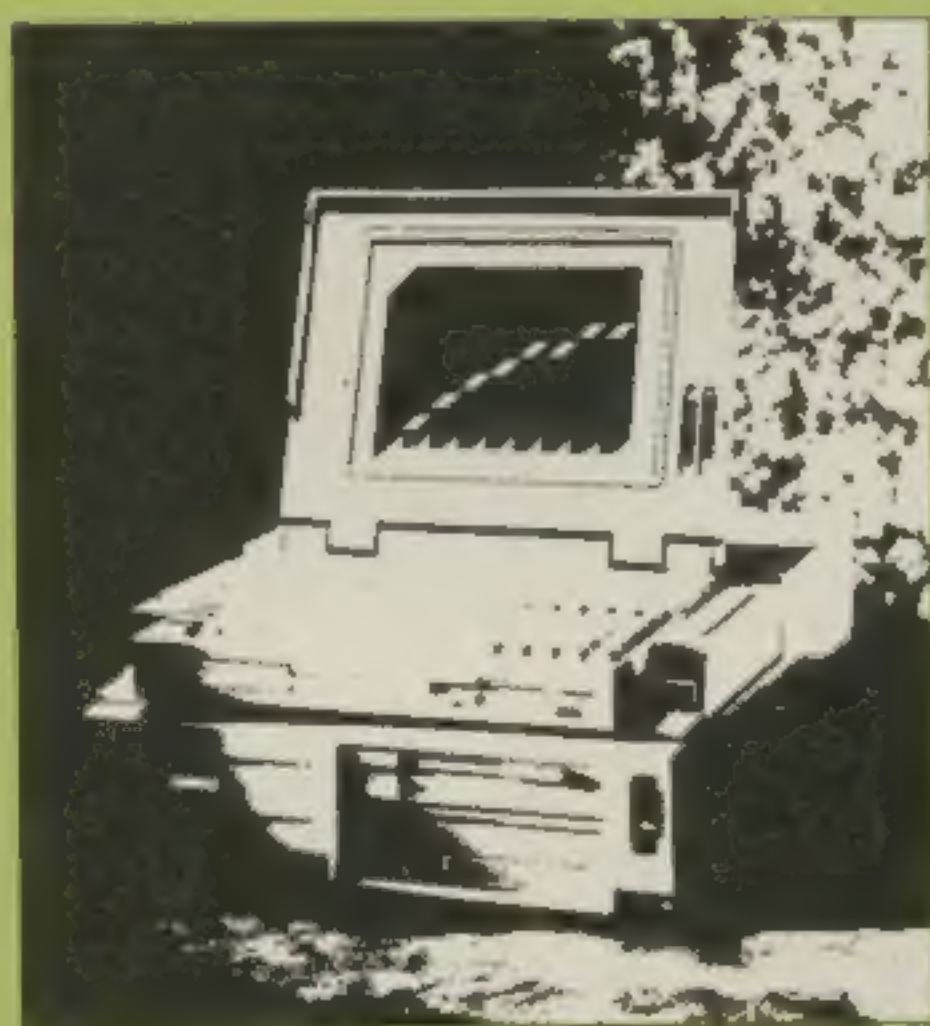
Making a Compaq

Even if Compaq doesn't win its legal tumble with Dell, it can at least be sure of paying the legal bills.

The Texas based company last week boasted that it had sold \$1 billion worth of computers in the third quarter of 1990. Sumsters (working with the American billion) will quickly work out that this amounts to a whacking \$11 million every day; \$457,875 each and every hour or \$7,631 every minute.

Sales were up 27 per cent on the same period in 1989, while profits soared by 70 per cent to \$135 million.

And we're expected to believe that the PC manufacturers are having problems... ■



Handheld money maker

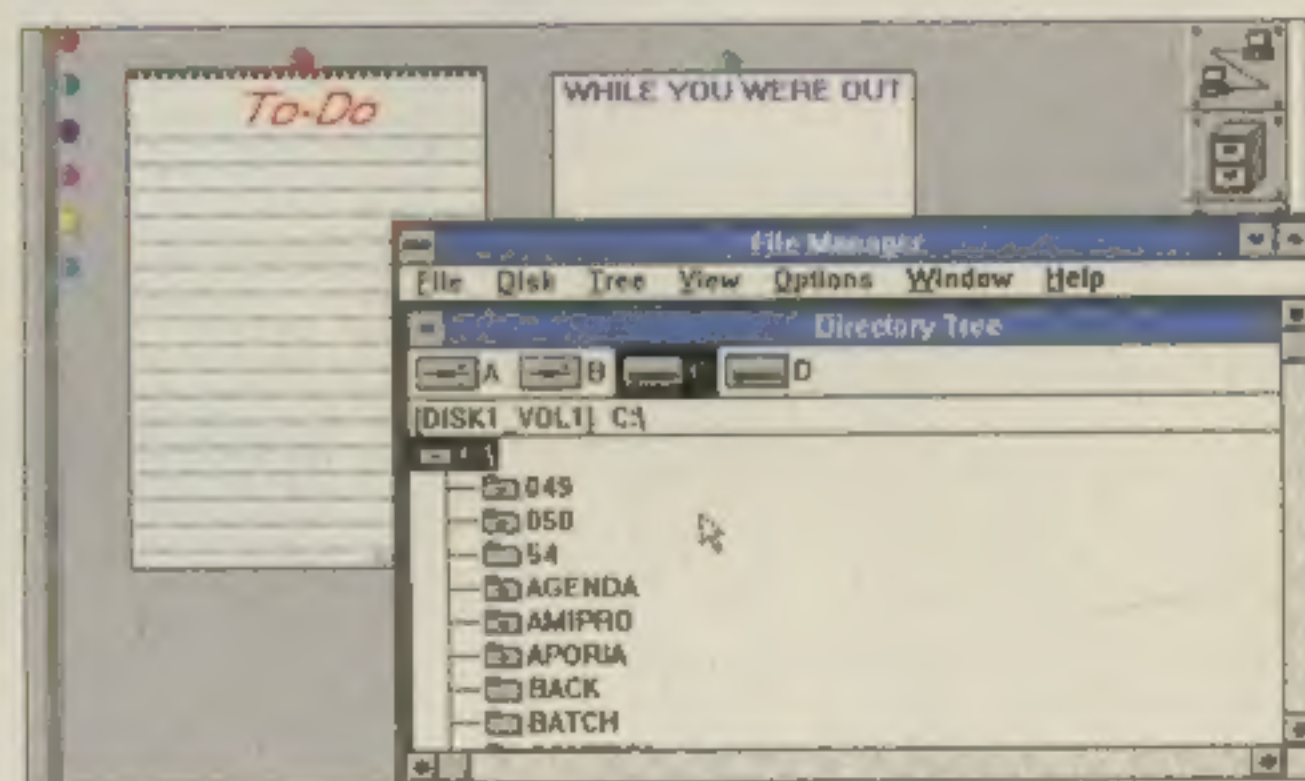
For some reason, certain dealers in the City have not yet warmed completely to the charms of high tech gadgetry. But for the converts there's a new gadget which promises to put them at the cutting edge of capitalism.

The Universal Yield Calculator for DIP/Atari's Pocket PC handles all those incomprehensible calculations which the treasury assures us is keeping Britain afloat.

The software, costing £375, from Mamdouh Barakat of Financial Systems Software has been two years in development. ■



MICROSOFT: 'OS/2 IS FAR FROM DEAD'



Microsoft has scotched rumours that it is to abandon its “next generation” operating system OS/2, saying that even more versions of the system are being developed.

A report in *The Wall Street Journal* last week claimed that the system would be dropped following the success of Windows 3. OS/2 has failed to make any significant impact since its IBM endorsed launch four years ago.

The new version of OS/2 will probably be able to run Windows 3 applications although there is talk of a version which will be able to run any DOS, Windows or OS/2 program.

Windows 3, only launched last May, has clocked up sales exceeding three million. In comparison, only 300,000 copies of OS/2 have been bought.

Microsoft boss Bill Gates said that OS/2 would not be scrapped to make even more room for Windows 3. “The operating system market has multiple segments with varying requirements. For customers needing high-end capabilities, deploying OS/2 applications or pursuing IBM's SAA direction, we market OS/2. We will continue to enhance and enable it to run Windows applications.” ■

● For a full analysis of OS/2's past, present and future turn to page 8.

SEGA ACTION CHAIR SET FOR UK

EXCLUSIVE

The Sega Simulator Action Chair – described as a joystick you can sit in – is to be launched in the UK for the Megadrive later this year.

Developed in the US and previewed in Express three weeks ago, the chair should retail here for £100. Sega is hoping to ship significant numbers into Europe by the summer.

The firm says it will run with most, if not all, Megadrive games but stresses that titles involving first person 3D perspective work best. Players control their on-screen characters by swerving in the chair. Fire buttons are located on the arm rests.

Megadrive players who tried out the chair at the recent London Toy Fair were unanimous in their praise for the gadget calling it "responsive and exciting".

A spokeswoman for Sega's

UK distributor Virgin Games said: "We played Super Hang On, Super Thunderblade, Super Monaco and Space Harrier 2 on the chair, and they were all great."

The chair, like any joystick, does not require electricity, and simply plugs into the standard joypad socket. It is still not clear whether or not the chair will be available for the 8-bit Sega games system or any other computers.



Missing in action

This little lot is a collection of stolen computers which the police scooped up a few years ago. It was the last big success for the law in the fight against computer thefts.

Now plans are being laid for a nationwide register which would contain the serial numbers of all stolen PCs. Applied Technology Adjusting, a firm based in the Insurance industry, is contacting 350 insurance companies which have handled computer loss claims.

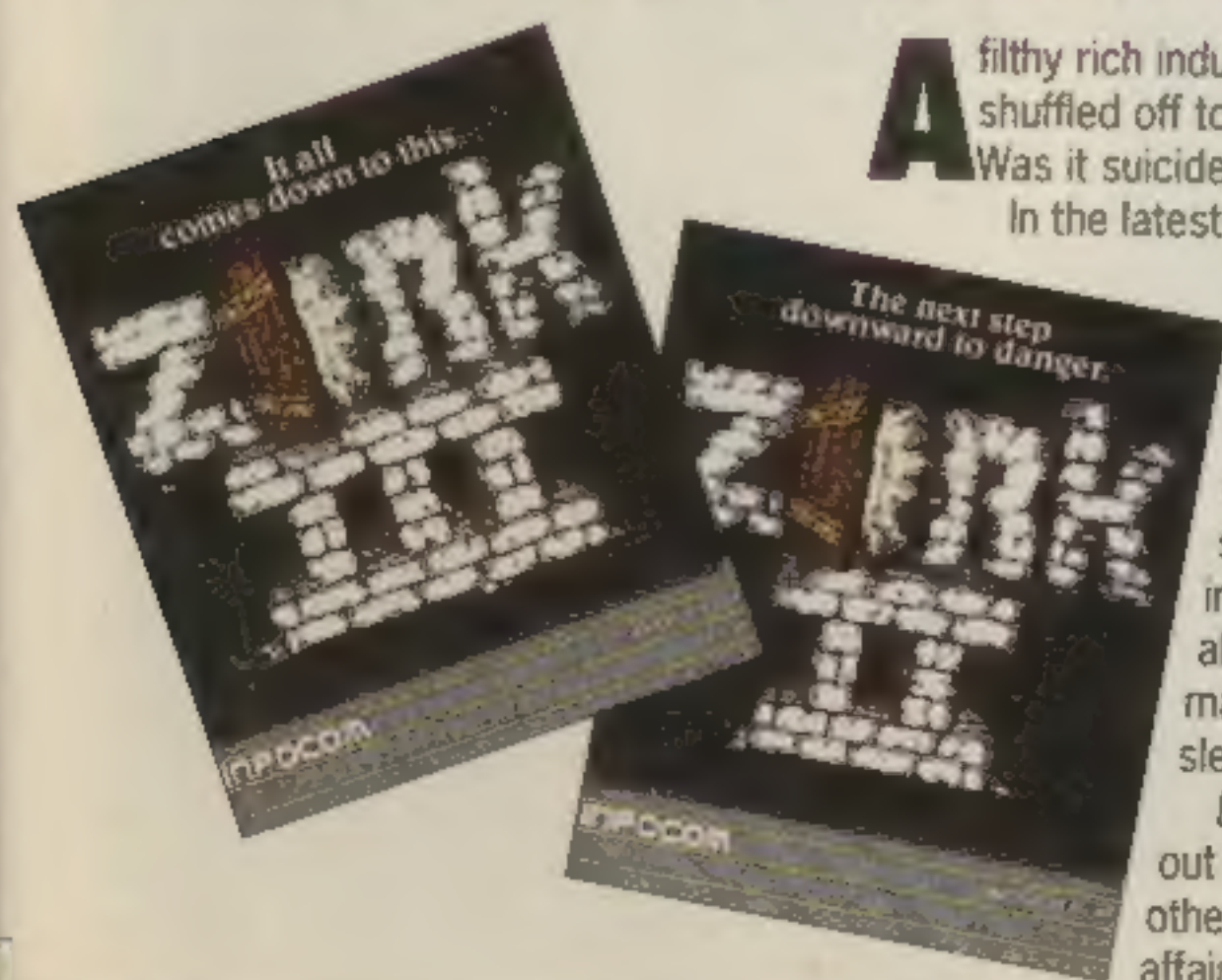
The company claims that a growing level of sophistication among computer thieves has prompted the move. Villains are not just grabbing hardware, but are also seeking out manuals, leads and even software.

Dealers are often being hoodwinked into believing they are buying second-hand computers and a great deal of stolen property is believed to be circulating in the trade.

ATA's Brian McHale said a computer theft register would be sent to dealers and auctioneers. Scotland Yard has welcomed the move.



DEADLY ADVENTURES RE-RELEASED



A filthy rich industrialist has taken a drug overdose, and shuffled off to that great shareholders meeting in the sky. Was it suicide or – shudder – a despicable murder?

In the latest low-cost release from Mastertronic/Infocom

it's your job to find out. *Deadline*, one of Infocom's better known contemporary adventures, has been brought back at a sprightly new price of £9.99. To learn whodunnit you must dig the dirt on six macho suspicious characters. But within this deadly investigation, the shady characters are moving about freely and plotting among themselves, making life even more treacherous for you, the sleuth.

Deadline is among five Infocom re-releases out next month for the PC, Amiga and ST. The others are more traditional wizards and trolls affairs *Enchanter*, *Sorcerer*, *Zork II* and *Zork III*.

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EVERY WEEK

Games Week

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Extra spacious hard disk

Why bother with flavour of the month CD-ROM disks when you will soon be able to get up to 300Mb onto one 3.5-inch hard drive.

This is the claim being made by Tokyo-based Sumitomo Special Metal. The company says that it has developed a record head using the amorphous metal technique which is already familiar to the computer industry. However Sumitomo discovered that adding cobalt-zircon to the mix allows the width of the read/write head to be cut by up to .20 of a micron. This tiny margin is just enough to allow for the extra storage space.

The company expects to start shipping the drive for an incredible £75 in the near future. Fast on its tracks, no pun intended, will be a 500Mb version. ■

Talking word processing

Users of WordPerfect 5.0 and 5.1 will soon be able to add audio annotation to any document at the touch of a couple of keys.

Voice It for Word Processing from Interactive Voice Systems will allow authors to leave audio messages on documents for their own benefit or for others. IVS says this will be especially useful for explaining difficult sections of text. Separate workgroups can jointly develop documents without costly meetings.

Recording a message is simple, you just have to position the cursor under a relevant line of text, press ALT-R and speak into the telephone style handset. Voice-It for Word Processing costs £244, there's also a version for Lotus 1-2-3. ■

Workbench workhorse

The Workbench Management System 2 is the latest in Amiga desktop accessories.

Comprising eight built-in applications, the system is aimed at making the life of the Amiga owner a little easier. Included in the system are a text editor, a calendar cum reminder, a phone book and auto dialer, an archiving tool and AmigaDos help. All of these are activated by a single button press. There is also an ability to create user defined functions which apparently entail no loss of memory.

The system is fully Workbench 2 compatible and can be configured for 4, 8 and 16 colour screens. It costs \$49 in the US, but UK distribution rights have yet to be sorted out. In the meantime call TTR Developments on 0101608 277 8071. ■

Commons crime

A virus has attacked the House of Commons. The Nomenklatura virus was developed by a Bulgarian who is known only by the alias, the Dark Avenger, and found its way into the Commons library last year.

The area of the library to be infected was the computer research section which contains reports sent in to MPs from all over the country. A number of Compaq PCs are networked using a Novelle system in order to compile and store the data, this network was the target for the virus.

The reports which are used by MPs when tabling bills, researching questions as well as



• Parliament: virus attack.

answers in the House and in committee, were delivered on disk. It appears that prior to the attack, none of the disks were checked for viruses.

Nomenklatura virus does its dirty work by

disrupting file allocation tables on PC disks. While this means that the data on the disk remains largely unaffected, it does make accessing that data next to impossible especially if it is stored in fragmented files. ■

Cinemaware loses CD gamble

PIONEER PULLS OUT

Cinemaware, the software house responsible for such games as *Rocket Ranger* and *The Three Stooges* is pulling out of the home computer market.

Following what company president Bob Jacobs described as "substantial lay-offs" which have cropped the Cinemaware staff to 13, the company will be "concentrating on consoles and the video games market".

Explaining the move in the light of recent dealings with Electronic Arts, Jacobs commented: "We had anticipated a large investment from another

software house. This did not happen. We had too many people to support, so basically the move is a question of dollars and cents. Consoles are safer right now."

Cinemaware's major commitment over the last few years has been to CD-based technology. *Defender of the Crown* came out in this form in 1987. According to Jacobs, this was going to be the saviour of the home computer in the games market. However, Jacobs told Express: "We are not going to wait two years before it happens."

Despite significant investment from CD-based PC Engine manu-

facturers NEC, it appears that the CD gamble has not paid off.

Cinemaware's move away from home computers won't be felt in the UK until later this year. Several new launches are planned for early this year. These will include *TV Sports Boxing*, *TV Sports Baseball* and a sci-fi special called *Roller Babes*. These will be distributed in the UK by Mirrorsoft.

Speaking on behalf of Mirrorsoft, PR representative Cathy Campos explained to Express this week that as far as the company was concerned, "it was business as usual". ■

Chip crash mystery solved

Scientists have finally discovered a cure for one of the main reasons for poor computer performance and possibly even persistent crashing.

For three decades a mystery had surrounded the amount of electronic noise which affected metal-oxide semiconductor (MOS) transistors which are the backbone for most basic computer chips. This noise, known as 1/f flicker, not only slowed down the activity of chips, it also lead to some actual malfunctions.

The problem resided in an ultra-thin layer of silicone dioxide which is fitted to insulate the chips. Scientists at Sandia Radiation Technology and Assurance Labs have discovered the layer was responsible for the flicker production. They have also found out that using the technology which produces more highly specified radiation resistant chips will cure this problem. ■

Mirror wheels out the past masters

Golden oldies from the Mirrorsoft catalogue are set to be rereleased at budget prices.

Classics such as *Speedball*, *Defender of the Crown*, *Rocket Ranger* and *Carrier Command* are to be re-launched on the ST, Amiga and PC at a rate of two every month. All games will be released under the new Mirror Image label.

Mirrorsoft says the new label will introduce new 16-bit gamers to the titles which, only two years ago, were considered state of the art. All games will cost £9.99. ■



• Rocket Ranger - soon to be re-released.

Apple prepares cheap printers

Rumours are gaining credibility that Apple will next month launch an ultra-low cost bubble jet printer and a cheap laser printer.

The bubble-jet will be called Stylewriter, it could cost as little as £350, and will almost certainly outperform more expensive printer

models. Apple expects the machine to take a large slice of the printer market.

Also, the company is expected to launch a cheap laser printer with a retail tag of about £700. Both printers will be shown for the first time at the MacWorld Expo at the Birmingham NEC in March. ■

Another exclusive news story from Express

ATARI SET TO CUT £100 OFF STE

Atari is set to slash the price of its STE by £100 to an almost irresistible £299.

The STE will replace the old style STFM at the base level £299 price point. In an announcement pencilled in for mid-March, the STFM will be officially killed off. At present the inferior STFM costs £299, while the STE retails at £399.

The basic STE will include some software packages although, for £399 buyers will be offered more sophisticated software. But anyone hoping for another giant games bundle will be disappointed. Due to pressure from computer software retailers Atari has decided not to go for the traditional 20 cheap games in a box idea.

Atari spokesman Peter Walker was last week refusing to either confirm nor deny the story. But he did promise that there would be a price restructuring operation, as well as a number of new launches.

These are likely to include the Mega STE, launched last year in

the US (Express 106) and a top-end UNIX machine. A low-cost laser printer will also make an appearance, as well as a reasonably inexpensive DTP bundle designed to challenge the Macintosh on price.

On the STE price drop, Walker commented: "Of course we are keen to create a recognisable and single environment for the ST range, but I can't say more than that. Price is a sensitive issue at present, especially since Commodore dropped the price of the Amiga to £329."

He is referring to the £70 'trade in your old computer' deal announced two weeks ago, which Atari regards as a thinly disguised price cut.

Clearly the ST versus Amiga war is heating up again. Atari is making the extraordinary claim that the ST is outselling the Amiga through retail outlets by a ratio of two to one. And Commodore reckons nobody is buying an ST if they can get hold of an Amiga.

The STE was launched early



• STE: down £100.

in 1990 as both a replacement for the STFM and as a serious competitor to the Amiga - the STFM is generally accepted to be considerably inferior to the Amiga in many departments.

But the STE boasts a built in blitter as standard making it

faster for games and graphics. There are also double the colours of the FM as well as stereo sound.

With a single standard, the job of sliding the STE into the market place appears to be over.

Bundles of learning

A range of 15 new educational software packages are about to hit the market on various formats. The programs have crossed the Atlantic from one of America's leading educational software houses Davidson and Associates.

Aimed at students from three years old all the way up to adults, subjects included are algebra, maths, reading, spelling and languages.

Following recent trends, the software was designed by teachers with actual classroom experience rather than by programmers. A wide range of techniques are used including arcade style animation and sound in the hope that this will make the learning process more enjoyable. Data can also be customised to suit specific learning requirements.

Individual student reports can also be produced as can certificates of excellence.

Despite the fact of the American heritage, attention has been paid to the National Curriculum. The programs will run on the PC, Amiga and Mac. Prices range from £29.95 to £49.95. For more information call 0626 332233.

Companies house on-line

Computers can now access the thousands of up-to-date reports and business profiles held by Companies House. Mercury Communications has clinched a deal which puts company information directly on-line.

Previously this had only been available by contacting Companies House directly and being sent microfiche, or by using the Infocheck system via Telecom Gold.

The new service is targeted at professional users such as solicitors and accountants, as well as information gathering organisations.

Once registered, a user will be able to download information rather than in edited form as had previously been the case. User are able to receive faxed copies of company documents. It is envisaged that a fully operational system will enable to download directly to PCs.

Whiteley back in prison

Nicholas Whiteley, the so-called 'Mad Hacker', has lost his appeal against a conviction for breaking into university computer systems.

The 21-year-old has been sent back to prison to complete the rest of a four month sentence. He was claiming that the computer data he damaged could not be considered "tangible".

First 9600 portable

The world's first V.32 battery powered 9600 modem was launched in London last week, by Andest Communications.

Costing £799, it will allow users to download more informa-

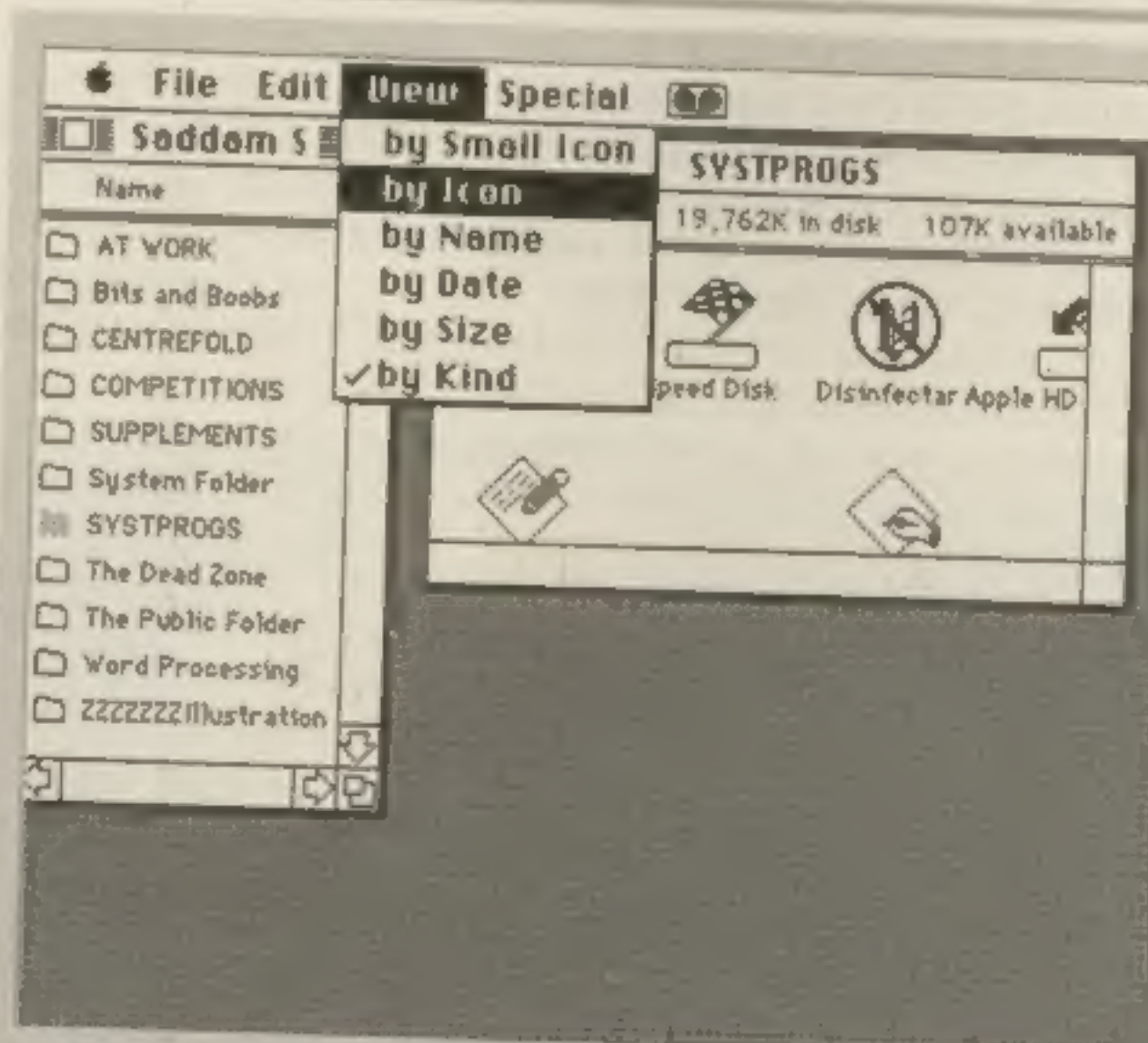
tion faster and more cost effectively. It will connect directly into the communications port of your PC and also supports acoustic couplers. Call 0908 263300 for more details.



• 9600: space saver.

Just scouting around

Young people spend five hours a week playing video games, according to a new survey conducted by the Scout Association. But the Scouts reckon youngsters would much rather be exploring normal avenues of entertainment like rock climbing and canoeing...



• Mac environment: coming to the PC.

PC running Mac

PC users could soon be able to use Apple's popular operating system, thanks to a secret Apple development.

Reports suggest that Apple is working on a system which could be ported over to 386 machines. Although PC users would have to

buy specially configured software, they could go about their business under the 'friendly' Mac environment.

Apple is denying the reports but sources in the US insist that the project, dubbed Mac30, is going ahead.

THE WEEK
IN VIEW

Peter Talbot, director of education for Commodore, discusses the declining situation of IT in British schools.

There is no doubt that several years ago the British education system was held up to other countries as a shining example of all that was good in educational practice, particularly with regard to the use of computers.

During the early '80s, education in the UK appeared to lose both its pride and its direction, and it was after considerable deliberation at the highest levels that a complete overhaul of the system was considered essential. This decision could not have been taken lightly nor without an awareness that there was inevitably going to be considerable recrimination and heartbreak for all those involved, especially since every aspect of the system was to be reviewed.

Inevitably teachers were going to bear the brunt of these changes. Looking back, no one could have expected the changes to have been so rapid and so far-reaching, not least in the use of IT. And just maybe the people at the top ushering in these changes momentarily forgot that the everyday teachers of the use of computers in schools largely had not had a basic grounding in computing during their own education. So whilst implementing a national programme of training would go some way to rectifying this, it was necessarily going to be a long and painful process.

In addition, this situation was going to appear even worse since those being taught in the use of computers at school were, as a result of the boom in home sales of powerful computers, far more conversant with the technology than those teaching them! Fortunately for the Government, this situation should only exist for one generation.

So, on reflection, perhaps the British education system has been through the worst and most painful effects of the changes and will now be able to build a broad and solid foundation for the use of computers in schools. Bearing in mind all the demands and changes that the teacher is subjected to, the use of new technology must be a worthwhile and job enriching experience, if IT in British schools is once again to be the envy of all other countries of the world. ■

New line up of a laptop, slimline PCs and desktops

CBM UNVEILS POWER PCs

Commodore UK last week unveiled seven IBM compatible PCs in the UK.

Known as the German range – because they were launched on the continent last year – the line-up includes a laptop, slimline PCs and desktops.

Not for the first time, Commodore is making bold claims that it will become “a major player” in the PC market within a couple of years.

At the top of the range is Commodore's first 486 – the desktop DT486-25C costs a hefty £4,699 (including monitor) and features 4Mb of RAM expandable to 16Mb and a 50Mb hard disk. There are four 16-bit expansion slots and a VGA graphics chip with 256Kb memory.

A 386 pitched at power users has also been introduced. Called the DT386-25NC, it is aimed at

“the user who has reached the limits of his performance or who wishes to use OS/2 or UNIX”.

The attractive slimline models include a 16Mhz 286 retailing at £999 (including 40Mb hard disk) as well as 16Mhz and 20Mhz 386SX machines starting at £1,199. Both come with a 52Mb hard disk as standard.

A 386SX laptop was also unveiled, the C3-86SX is designed to complement the C-286LT launched last year. Price has yet to be arranged.

The appearance of these new machines coincided with the introduction of the long awaited Amiga 3000 running Unix System 5 version 4. The Amiga 3000UX is definitely a top-end piece of kit reserved for expensive graphics design. It zips along at 25Mhz and comes with 8Mb of RAM and a 100Mb SCSI drive. ■



• Commodore 486: top of the range.

Japan's brave neural world

The race is on to produce the next, or Sixth Generation, supercomputer. And at the moment Japan is the only contestant with a massive new project concentrated entirely on neural networking due to begin in 1992.

It is widely accepted that only two countries in the world have the capability of producing cutting-edge supercomputers; Japan and the United States, and IBM, the American giant, has done next to nothing in neural research. So the race for the first fully operational business brain emulator has Japan in the first place.

If the gamble pays off with self-programming, diagnosing and learning computers becoming the standard, then the emphasis of computing will almost certainly switch from West to East.

There is an air of confidence about the whole project with three major players in Japanese culture contributing resources, funds and people. Government, industry and the educational establishment are all taking part. The Ministry of International Trade and Industry (MITI) has instigated, and will control the £770 million (200 billion yen) Sixth Generation Project.

Other companies involved include Fujitsu, second only to IBM on the world stage, and with the vested interest in overturning this state of affairs. Matsushita and NEC are also committing funds to an area of research which the

West has tended to view as fashionably left-field rather than workable for some years. This level of commitment and finance indicates that the project is taken very seriously in Japan.

It has been suggested that one reason for the neural angle is that Japan is expecting a deficit of one million programmers by the end of the century – a self-programming computer would level this state of affairs hugely. Equally important is the fact that computers which can learn do not need to be paid, nor do companies who use them ever need to lose days of work through staff sickness.

Neural networking is not a new concept in either Japan or the United States. The 1950s saw the US carrying out some research into the area. The Japanese have already produced a basic ten neuron emulator (the human brain has billions of neurons). These are silicon chips which purport to mimic the animal and potentially human brain, rather than simply crunch numbers.

The end of the Sixth Generation project could see computers which do not need to be programmed, but which can learn tasks for themselves. With the funding which the project is to receive no one quite knows how complex the new computers could be. Additionally, once true neural networks are commercially available they should be able to design Seventh and Eighth Generation machines themselves. ■



• Fists of Fury: thumping, beating, biffing and even more thumping-'em-up from Virgin.

Beats international

Four big names in one new package, that's what Virgin Games is promising with a new game compilation called Fists of Fury. Included are the hits Dynamite Dux, Ninja Warriors, Double Dragon II, and Shinobi.

All four of the beat-'em-ups have already been hits in the arcades and on the 16-bit and 8-bits machines. Ninja Warriors sees two killing machines attempting to overthrow the rather unpleasant President Bangler. In Double Dragon II, Billy and Jimmy are rather miffed at the death of the gorgeous Marian and set out to kill anyone who disagrees. Shinobi, the Sega classic, sees you rescuing children and, er, beating people up. Dynamite Dux, more stolen children and more thumping.

The package is available on all 16-bit (£24.99) and 8-bit (from £14.99) formats and is available now. For more information call 071-727 8070. ■

Pre-launch price cut for Sega Game Gear

Sega's hand-held games machine, the Game Gear, is set to become the cheapest colour console on the market when it is released.

A price-point of £99 has been fixed instead of the previously expected £130. Sega's machine is therefore £40 cheaper than the Atari Lynx, which was launched here in September.

UK distributor, Virgin Mastertronic, is understood to be pushing for an early UK launch. The trade had not been expecting deliveries until the autumn, but a high level of press and public interest has caused Virgin to reconsider.

Certain leading retail outlets in the London area say they are expecting official Game Gear deliveries within a matter of weeks.

Atari is expected to respond with a £30 to £40 price cut on the Lynx, although that will probably not be effective until September. ■



• Game Gear: cheaper and sooner.

Amiga clips

Amiga owners hoping to exercise some design flair might be interested in investing in clip-art images.

A new library has been set up containing 25 disks featuring Amiga IFF clip-art in eight-colour medium resolution. Each disk contains clip-art for a specific subject, so you buy what suits you. Categories include travel, sport, science, office, fashion, pubs, business and even estate agencies. Each disk is claimed to be 85 per cent to 100 per cent full and costs £14.95. Or you can buy the complete set for £199. Contact Digigraphic at 1, The Terrace, High Street, Lutterworth, Leicestershire, LE17 6BA. ■

Bull cuts workforce

The European hi-tech computer establishment really is having a rough ride. Last week Bull, France's largest computer company, slashed its workforce by 17,000.

The job-cuts are part of a restructuring plan designed to revive the fortunes of Bull. Some 5,000 employees are expected to lose their jobs over the next year.

Many large European computer companies have fallen on hard times and are being forced to cut back at present.

Bull posted a loss of 1.88 billion francs for the first half of last year and does not expect to return to profitability until next year at the earliest. The company manufactures high-end equipment for governments and large corporations, but also owns well known PC manufacturer Zenith. ■

Damning report on computers in schools:

'BRITAIN IS FAILING'

Britain is failing to deliver an adequate computer education to our children, according to a report published last week by the Parliamentary Offices on Science and Technology.

The report suggests that schools in England and Wales need a cash injection of at least £319 million over the next five years. It also recommends that the system of distributing computers to schools be reviewed in order to make it fairer.

Government cash to train teachers to use computers in the National Curriculum currently stands at £6.7 million a year, but the POST report reckons that the figure needs to be upped to £37.7 million per annum.

The report has also called for the Government to publish a list of specific aims for computer education, saying that conflicting interests in different areas of the country had seriously weakened the system.

The surprisingly critical report

is the first from this all-party committee, which was set up two years ago. It compared the state of computer education in Britain to that of the US, where there is an average of 30 computers in every state school.

Here, some schools within the same local area boast ten times more computers than their neighbours. The report warned that the gap between richer and poorer schools would be widened unless remedial action was taken. ■

Intel's 100MHz monster chip

International chip manufacturer Intel has announced that it is working on a processor claimed to be 20 times faster than a 386 chip.

And the company predicts that it is on the threshold of a major breakthrough in chip technology saying that processors of the next few years will be up to 40 times faster, and much smaller than today's equivalents. David House, Intel's senior vice president, revealed: "You can be confident that there is a 100MHz silicon chip operating at Intel today." ■

Writer dies

Tim Hartnell, well known writer and publisher of computer books for home enthusiasts, has died in Melbourne, Australia, aged 40.

Hartnell became well known among computer owners in the early 1980s when he wrote a string of "how to" books based mainly on the Spectrum. His area of expertise was in teaching BASIC programming to inexperienced computer owners.

More recently, he set up a book publishing company in Australia which released tutorials written for students. ■

Test drive a MiG-29

Soviet-made military hardware has been getting a bad press over the past few weeks, but this has done nothing to stop Domark giving the all clear for its MiG-29 Fulcrum simulation to take off.

Fans of Soviet-made kit will be able to take the controls of a MiG - hundreds of which form part of the Iraqi military machine - in "real world" scenarios including the Russian / Chinese borders, the Baltics and, you guessed it, the Persian Gulf.

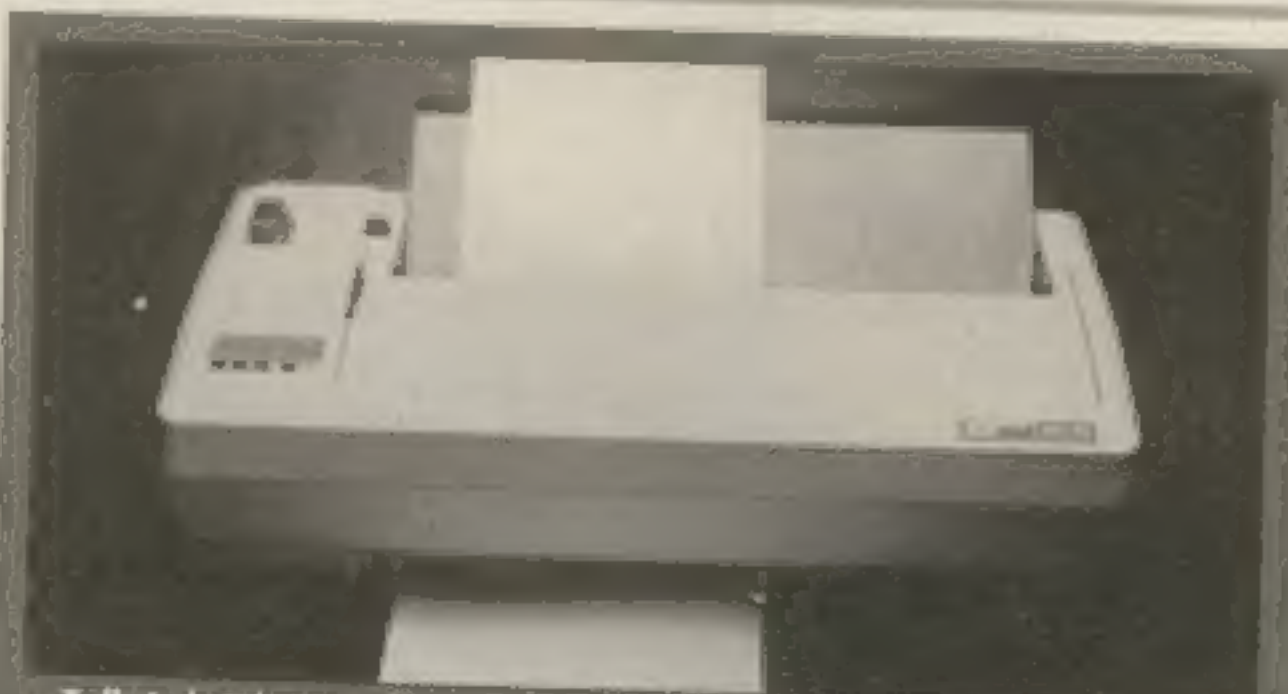
Missions include photographic reconnaissance of a US submarine, an air to ground missile attack on oil installations and a bombing raid on sea forces.

Your MiG will be armed with



• MiG-29 Fulcrum: the other side.

the usual missiles and tricks, and there are chances to take out of cockpit views and even missile eye views. MiG-29 Fulcrum is out this week on the PC, Amiga and ST at between £35 and £39. ■



• Tally's brightest colours.

Character with colour

Two low cost 24-pin colour printers have been released by Mannesman Tally, completing the company's latest round of printer launching.

An 80 column printer, the MT130/24F colour will set you back £669 while the wider carriage MT131/24F comes in at £779. Both are rated at a standard 300 characters per second (cps) in draft and 100 cps in letter quality. Tally is also claiming that both emit "low noise level" achieved by using a noise dampener.

Last week the company released a low cost 24-pin dot matrix printer. If you're interested in the new products call 0734 788711. ■

Diary time

The fourth International 16-bit Computer Show will be held between 12th to 14th July at the Novotel in Hammersmith, it was announced last week.

Organiser Westminster Exhibitions reckons it will be the biggest ever, beating the January event's record of 150 exhibitors and 21,000 visitors. The show is dedicated to the latest kit and the best bargains on the ST, Amiga and PC. For more information call 081-549 3444. ■

Is the success of Windows the coup de grace for OS/2?

TWO NEW OS/2s TO TAME THE 32-BIT PC

by Mike Hardaker

All modern computers use an operating system as an interface between the base hardware and the applications. For the IBM PC and compatibles a number of operating systems exist, but the dominant one over the 1980s has been MS-DOS, the Microsoft Disk Operating System.

It first appeared in 1981, along with the PC, and it was fine on those early machines. It still performs a perfectly adequate job on entry-level PCs. However, since 1984 (when IBM brought out the PC-AT) it has not been able to exploit all the facilities of higher-powered PCs. MS-DOS is written for the instruction set of the Intel 8086 microprocessor – a derivative of which, the 8088, was at the heart of the first IBM PC – while the AT used the more sophisticated 80286. This chip is able to emulate an 8086 (the so-called Real Mode) but it also has its own instructions (Protect Mode). Running 'native', the 80286 can use more RAM – 16Mb instead of 1Mb – and run multiple concurrent programs (multi-tasking). Unfortunately, raw DOS cannot access Protect Mode, so if you want to run DOS applications you are restricted to Real Mode, using the 80286 as no more than a souped-up 8086.

Although Microsoft's UNIX derivative (XENIX) was offered as an option on the AT, the vast majority of users stuck with the familiarity of DOS. However, IBM and Microsoft were keen to provide an operating system which would be able to get the most out of the new machine and so they began developing a 'new DOS'.

ENTER OS/2

It was in April 1987 that this new operating system was announced. Called Operating System/2, it provided a way for users to run applications which wouldn't fit into DOS's 640K RAM limit. Also, it supported multi-programming and

multi-threading, two subsets of multi-tasking. Multi-programming is the ability to run more than one application at the same time, while multi-threading is where a single application consists of more than one concurrent 'program' (so, time-consuming tasks like spreadsheet recalculation can be run in the background without locking up the entire application). A 'DOS Compatibility Box' was also included, allowing DOS applications to be run.

The initial release of OS/2 was 1.0, and became available towards the end of 1987. This contained the operating system kernel (the key part of the system) and was primarily intended for developers, giving them a taste of what was to come. It took another year for the first full version to arrive, Release 1.1. This added the Presentation Manager, a windowing, graphical front-end for the user.

Although IBM and Microsoft both made a lot of noise about OS/2 and most of the software heavyweights pitched in with their support, it has not had anything like the success which was hoped for at its launch. There are a number of key reasons why this is so. Firstly, OS/2 demands significantly more RAM than DOS does – 3Mb is considered a bare minimum. Until very recently, this made a significant difference to the price of a PC, although with RAM prices dropping fast it is no longer the issue it once was.

Secondly, there were a large number of older programs which wouldn't run in the DOS box – and since OS/2's low sales meant comparatively few applications were available for it, you really did need to be able to run DOS programs.

Finally, it was written for a chip which rapidly fell from favour.

In 1986, ALR and Compaq produced the first machines based on a new microprocessor from Intel, the 80386. This could emulate the 8086 and 80286, but its power came from some extra features, key among which was Virtual

Mode. Virtual Mode allows the 80386 to emulate multiple 8086s, each one of which can run a DOS program. The 80386 was followed by the 80386SX, a cut-down version with the same instruction set as the 80386 but a similar price-tag to the 80286. And then came the 80486, a significantly faster chip once again compatible with the 80386.

It rapidly became clear that the PC's future lay with the 80486 chip, and the 80286-based OS/2 suddenly looked a bit old-fashioned.

WINDOWS

At first sight, the main advantages which OS/2 has over DOS are a user-friendly graphical front-end, the ability to run large programs and the ability to run several programs at once. However, DOS has gradually had these added to its armoury. Several programs have appeared which allow multi-tasking of DOS applications – including DESQView, TopView and VM/386 – while a number of graphical environments have come to market, such as the ill-fated GEM. The DOS 640K limit remained a problem for some time but various ways of breaking the barrier have been tried, culminating in a set of standards known as the DOS Protected Mode Interface.

One program has managed to tie all these together, however. Microsoft's Windows has been around since 1986, although the early versions were somewhat clumsy to use. For the release of Windows 3 in mid-1990 Microsoft tidied up the user interface and allowed special Windows programs to use more than 640K of RAM.

Nevertheless, Windows is not perfect. One of the main reasons for this is that it is still hobbled by many of the limitations of DOS. Most people agree that OS/2 is a technically superior operating system, but unfortunately the real world demands the ability to run DOS applications and OS/2 isn't too good at that.

THE FUTURE

What's needed is an operating system which can provide the best points of both OS/2 and Windows in a single package. It must be able to run multiple DOS and Windows applications, while offering the improved operating system kernel of OS/2, including support for threads, better security and a level of 'future-proofing'. This mythical operating system is currently under development. Known as OS/2 2.0, it supports the 80386 instruction set and thus allows multiple DOS programs to run. It is also being written to allow Windows applications to run under the Presentation Manager interface (which looks practically identical to Windows as far as the user is concerned, but is somewhat different to



• Microsoft boss Bill Gates: sticking with OS/2.

the programmer). Although earlier releases of OS/2 were jointly managed by IBM and Microsoft, the overall project management for OS/2 2.0 is being handled by IBM alone (although the coding is still being done by both parties).

Microsoft, meanwhile, is in charge of a separate project known as OS/2 3.0. This is not 2.0's replacement, but another operating system intended to be sold in parallel. Whereas 2.0 is specifically for machines using the Intel 80386 family of microprocessors, 3.0 is intended for RISC machines, such as the Sun and Apollo workstations. To the user and the developer it will appear identical to the Intel version, but it requires a new operating system kernel (to interface with the hardware) which is being developed under the code name NT, for New Technology.

At the same time, a new version of Windows is being written. This is a project known as Win32 (for the 32-bit addressing of the 80386 family) and takes Windows further away from its DOS base by exploiting more 80386 features. What this means in real terms is that three small computer operating environments will be available from the IBM-Microsoft alliance in the future. The first will be Windows/32, running on the DOS kernel and offering much the same as the current version of Windows together with some extra 80386-specific features. The second will be OS/2 2.0, which will have everything Windows/32 has, together with the ability to run multi-threading OS/2 applications and exploit the other special facilities of the OS/2 kernel. Finally, there will be OS/2 3.0, which will do exactly the same as OS/2 2.0 but on different machines.

That's the theory anyway – three operating systems which will exploit 32-bit technology while keeping faith with the DOS installed user base. Whether it all comes together on time (and works the way it is meant to) is a different matter. But if things go as planned, the operating system world could look significantly different by this time next year. ■



• The IBM PS/2 model 555X supports OS/2 Standard and Extended editions.

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DTP SHOWDOWN

Everyone knows what a great machine the Amiga is for video, animation and even MIDI, but few seem to see the machine as a serious contender within the Mac and PC-dominated DTP market. This really is quite surprising, as there are some very powerful packages available. *ProPage* is regarded as the top Amiga DTP package, due mainly to its professional image and some very good marketing. That's not to say *ProPage* isn't any good – it has always been a great package and with the release of version 2.0, Gold Disk's program looks set to rise to further heights of excellence.

Soft-Logic's *PageStream*, on the other hand, hasn't fared so well. Despite the fact that the package featured some quite innovative features, the presence of some rather major bugs earned it a rather unwelcome reputation for being unstable. With the release of version 2.1, Soft-Logic hopes that *PageStream* achieves the success it so deserves. Both packages have been released at roughly the same time, hence the task of choosing between them. But which is best for you? Read on...

Of the two programs, *ProPage* has undergone the most radical changes. As soon as you load it up, you'll notice that the program now features a very flashy bass relief look to many of its gadgets and requesters. This is to bring it in line with the new look to *Intuition* within version 2.0 of the Amiga's operating system.

PageStream's user interface has hardly changed, although several of the requesters have been extended. It still has a very GEM-like feel to it, though thankfully it doesn't share GEM's slow speed, so we can forgive Soft-Logic for not making the program look pretty.

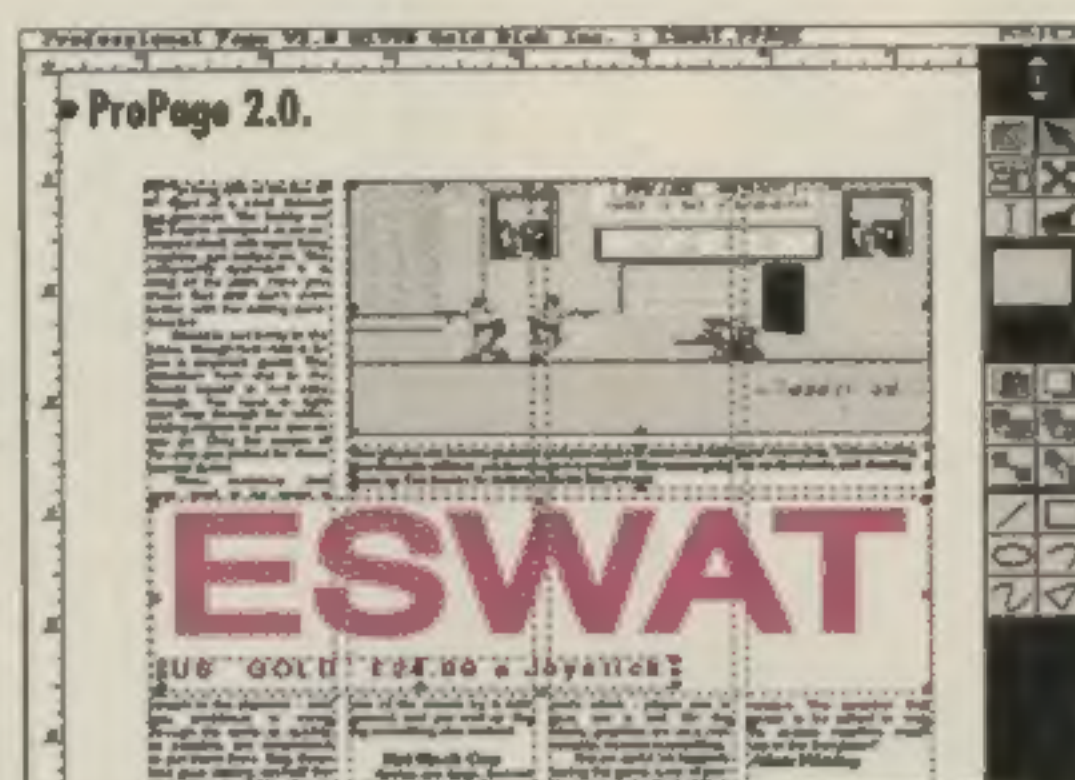
TEXT OUTLINE

Although you can use standard bitmapped Amiga fonts, both packages rely heavily on outline fonts to produce the high quality output. Because these fonts are structured, they can be resized without loss of resolution.

PageStream comes complete with a total of 11 different outline fonts, three of which are Compugraphic. *ProPage* only includes two Compugraphic fonts and a selection of bitmapped fonts, so you're limited. Both Soft-Logic and Gold Disk produce a range of additional outline fonts, so you're not stuck with just what the packages offer. One very nice feature of *PageStream* is its system of 'Text Objects'. These are boxes containing text which can be stretched to just about any size by simply dragging out the box that contains it. In this way, you can write a headline for a layout without messing around with horizontal scales and point sizes.

New to *ProPage* is its 'Article Editor' which is basically a word processor which runs concurrently with

Jason Holborn pits Gold Disk's Professional Page 2.0 DTP system against the latest release of Soft-Logic's PageStream.

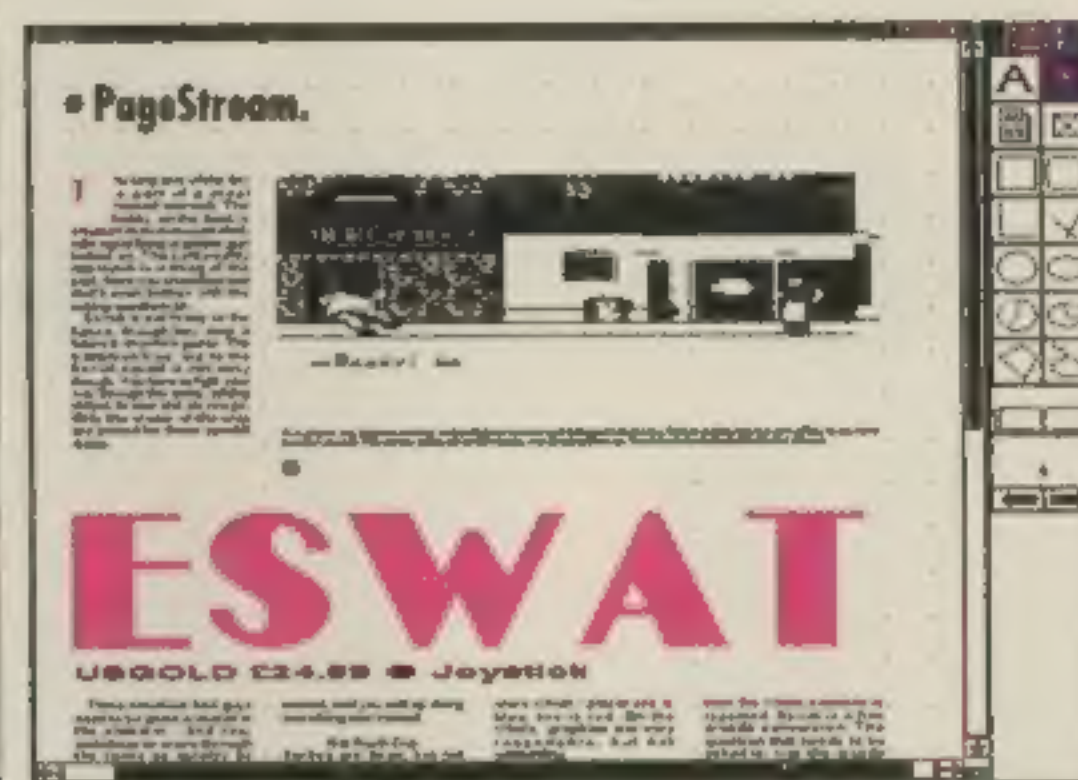


ProPage. Because the article editor is text-based, editing text is much faster than it is within *ProPage* itself. It is fully integrated, so it's possible to swap text between the two with a single keystroke. To back this up is a 90,000 word spelling checker. Another new feature is a Style Tags facility – glorified macros which can be set up to change the font type, size, style, etc., of a block of text within a single operation. An unlimited number of these can be set up. Both packages allow boxes containing either text or graphics to be rotated at any angle. *PageStream*, however, takes this facility a lot further, as you can also slant and twist a box in 3D. While this is a new feature within *ProPage*, *PageStream* users have been twisting and rotating for years now.

ALTERNATIVE IMAGE

Surprisingly, *PageStream 2* seems to come out on top within this all-important category. As well as the usual support for IFF ILBM files, *PageStream* will import structured images in a variety of formats (including EPS and even clip files from Gold Disk's own *Professional Draw*). *PageStream* also has import drivers for a vast range of additional image formats including TIFF, IMG, Degas and MacPaint. *ProPage* is less comprehensive, but all the major Amiga image formats are there. Common to both is the ability to import 24-bit images. These can't be displayed on screen in all their glory, but both will output them to Postscript using colour separation.

Both packages allow you to flow text around any pictures, although *ProPage*'s handling of this all-important feature is surprisingly limited. Short of building up a group of transparent boxes and then rotating them to form a sort of mask over the graphic, *ProPage* does not



allow you to run text around irregular-shaped objects. Even clips from Gold Disk's own *Professional Draw* are treated as rectangles once they are imported.

COLOURFUL CHARACTER

The Amiga's strength lies in its colour capabilities, so you'd be right to expect to be able to use colour within your layouts. Thankfully both do support colour, although *ProPage* definitely scores the highest here.

One of the most important new additions to *ProPage* is its Pantone colour matching system (PMS). It's now possible to choose colours using a recognised industry standard for colour reproduction. *PageStream* doesn't directly support PMS, although colours can be selected by typing in their Pantone reference. When you do this, *PageStream* automatically converts them to process colours (CMYK percentages). Some Pantone colours don't have CMYK equivalents, so this doesn't always work accurately.

When it comes to printing your pages to paper, there's very little to separate either. Both support full colour separation to postscript devices, so professional users are well catered for. For home users, both print to a large selection of dot matrix, laser and inkjet printers, most of which have their own custom drivers.

Because fonts within both packages are handled as structured objects, the quality of your final printout is limited only by the resolution of your printer. As a result, output is good even on an inexpensive 9-pin dot matrix.

DECISIONS, DECISIONS...

It's very hard to choose between these two packages – *ProPage* seems a far more professional offering, whilst *PageStream* is great for knocking up quick layouts.

If you're a home user, then *PageStream 2* is the one to go for – as Soft-Logic itself claims, *PageStream 2* is certainly the simplest to use DTP package you're likely to encounter. If your needs are more demanding, then *ProPage 2.0* is the best bet. Having said that, Gold Disk could still learn a thing or two from *PageStream* – 'Text Objects' and the ability to wrap text around irregularly-shaped objects are just two features that would make *ProPage* even better. When it comes to the crunch though, *ProPage 2.0* still comes out on top. ■

Both *PageStream 2.1* (£199) and *Professional Page 2.0* (price not yet released) packages are available from Silica Systems on 081-309 1111.

AMIGA DTP – THE FINAL WORD

We all know that the Amiga certainly isn't the 'bee's knees' where DTP is concerned, but it's getting there. Compared to the kind of DTP software Amiga users used to have to contend with, programs such as *ProPage* and *PageStream* have lifted the Amiga into the realms of serious publishing.

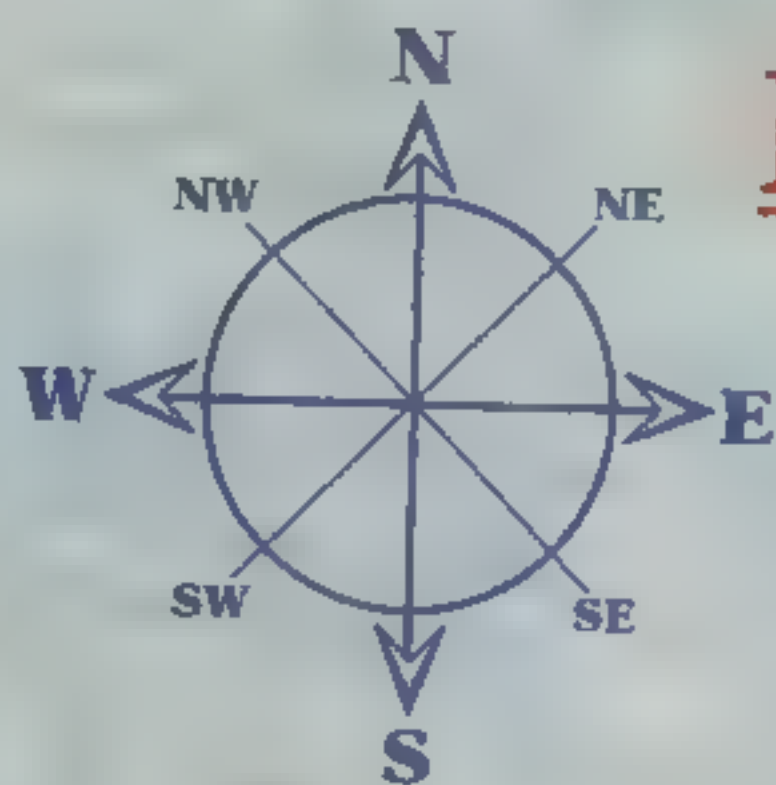
Indeed, the one (and only) thing that stops the Amiga from being a

serious DTP contender is its operational speed. Both programs are annoyingly slow, often leaving you waiting for minutes whilst the display is redrawn.

What both *PageStream* and *ProPage* really need is a 25 MHz A3000 linked to a multisync monitor (no more flicker!). Even Mac DTP programs can be very slow on a 'basic' machine like the new Classic,

which explains why the vast majority of Mac DTP people go for the '020-based Mac II or even the much faster Mac IIfx.

When used on an accelerated Amiga, both programs are transformed into totally useable systems. If you're serious about your DTP work, then a processor accelerator should be at the top of your shopping list.



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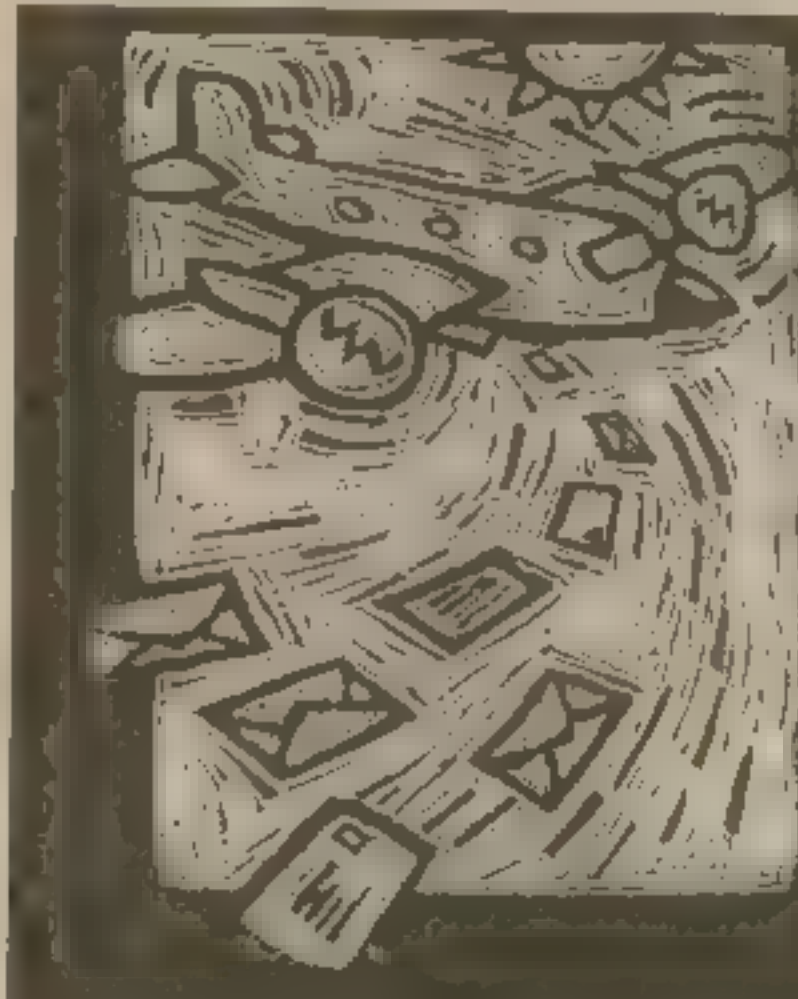
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■ Another PAL

In reply to Andrew Whittaker's letter in *Express* 115, I think he has not quite understood my last letter, judging by his overly simplistic view of the problem.

I am well aware that the maximum screen update speed is ultimately related to the number of planes and the resolution being used. What he does not explain is how this applies to adventure games such as *Jinxter*, puzzle games like *Pipmania* and many more. Not every game is *Shadow of the Beast* - or is this an excuse not to look for a way around the problem? I agree with his point - '90 per cent of British games are written as PAL products with little or no thought.'

On the C64, the push was for faster games that used a larger area of the screen than the machine was designed to support. On the Amiga, the reverse seems to hold true.

The bottom line is: aren't these facts all just excuses? These facts are problems, and most problems can be overcome. I'm sure that if readers look through their back issues they will see that the 'fact' of a year or two ago was that the Amiga did not have a large enough user base in the UK, which is why the full PAL screen was not being used. The current 'fact' may have changed, but this does not excuse all games - a few per cent at most.

After all, what's the point of having a computer with the screen update at an N-Cube if the display is only two lines? I bet even you, Haydn, never chopperised your Lambretta just to get another five or ten MPH out of it.

Alan Foster, Southampton

I've never owned a Lambretta Alan - but in my youth I once fixed up a 12-volt travelling hairdryer so that it blew air into the carburettor intake on an 850 Mini. The car went like a rocket for about 20 miles, before the engine blew up!

But I digress. You're quite right about problems evolving into solutions - and once programmers and publishers find there's a real marketing advantage in bigger screen games (as they did on the C64), you can be sure that the prospects for PAL games will improve.

H F-W

■ Standards Debate

Globetrotting Steve Gold (*Whole Wired World*, *Express* 116) must be suffering from extreme jet-lag.

Phillips did indeed show DCC in Las Vegas, but the partner in this venture is categorically not Sony. Only by a large stretch of the imagination could the DCC system claim to be based on either CD or DAT technology - it is a different animal.

Sony is not sure what the future holds for DCC, but one thing is certain - it will not be in the computer world. Its capacity and data transmission rate is far less than DAT, which is a good computer back-up medium.

Steve is right on two things. It is debatable whether the world needs DCC - which is why Sony is fully backing DAT. And DAT will be firmly established by the time DCC sees the light of day.

Paul Campbell, Sony UK

So the Digital Compact Cassette isn't all that Steve cracked it up to be... good to see that Sony takes such a close interest in what Steve has to say.

H F-W

■ PCW defender

Why do all the writers in *Express* find it necessary to slag off the PCW? It's an excellent computer that I, and many thousands of other users, wouldn't swap for anything else. And we don't have pirates or viruses - perhaps that's why the PCW gets knocked so much: jealousy.

I refer in particular to Keith Pomfret's

statement 'there are many adventurous things you can do with a PCW, but I am afraid serious DTP isn't one of them'. Try asking your colleagues on *8000Plus* - ask them about Creative Technology's Micro Design 2 and their excellent ProScan. The package is far superior to anything currently available on the ST or the Amiga - and before you ask, yes I have used the other machines.

Okay, so PCW DTP isn't up to the quality of the Mac, but we haven't all got Mac money. Plus - who needs colour when one can only print out in black and white?

S Kilcoin, Basildon, Essex

Hah! Gotcha. You may only be able to print out in black and white using your standard PCW printer - but what if you bought a colour printer? The green screen would hardly help you visualise pages...

But joking apart, the PCW is indeed a pretty neat machine, and one that's not half bad at DTP. Keith was alluding to its limitations - a DTP set-up on the ST, Amiga or even the Macintosh can be lot more open-ended than one based around the PCW.

H F-W

■ MCIMCTYC!

I've got a new one for you - the 'My Computer Is More Crap Than Your Computer' debate. Let's get the ball rolling with my Nascom 1 - it's rather old, and crappier than pretty much everything you could possibly define as being a computer. Here are its specifications:

- Colour - well, not quite. Nice shade of white on black though.
- Sound - mute. Hasn't said a beep in 12 years.
- Graphics - nope, sorry.
- Memory - an entire kilobyte of RAM
- Guts - one Z80. There appears to be no

blitter in any form at all.

● Software - write your own, you lazy git! That's what you bought it for. And no more than 1K, mind.

● Storage medium - compact audio cassettes, no less.

● Cost - £125 (and that was in kit form!)

Daniel Walker, Reigate, Surrey

Not so many years ago research scientists in the world's leading universities would have killed for that computing power on their desks!

H F-W

■ Wrong end of the stick?

I am used to the off-hand way in which you frequently reply to readers' letters, but your nasty response to Mr Patton-Smith (*Express* 116) cannot go without comment.

I, too, had always thought that you paid for every letter that you printed. Anything that you have occasionally said about particular individuals not getting their fivers, I assumed to be part of your quirky sense of humour.

I, too, according to your criteria then, must also be 'a plonker'. However, not being prepared to accept that description without putting it to the test, I decided to show several copies of your magazine to other people to see what they thought. I first asked them to tell me what they thought your heading meant.

Without exception, all 23 friends and colleagues I asked said they felt that your heading inferred that all letters were paid for, even though some pointed out that it did not say that. I then asked them to read all the letters and your replies and asked them if their opinion had changed, and if so, how.

They were divided on what your



replies actually meant when you specifically mentioned money. A few said that they knew that it was common practice in other magazines to only mention the prize being sent to a few individuals when, in fact, all were to receive a prize. Nobody thought that you meant only to send a fiver for those specific letters.

People were confused by your comments under certain letters that you would NOT be sending them a fiver. Like me, most thought that it was part of the style of your letters page and that you were being 'funny'. Although some felt you were actually withholding payment for those particular letters, everybody felt that, in general, letters were paid for.

Nobody I talked to is 'a plonker'. I am not 'a plonker' and I take great exception to being insulted in this way.

The only plonker involved is you. You have been very rude to one of your readers who had a fair point to make. I read his original letter with interest and noted the response from other readers. Mr Patton-Smith is quite justified in his remarks about your magazine filling its pages for very little payment.

It is quite clear that you deliberately set out to deceive (Hold on there sir - you're straying into the realms of defamatory statements - H F-W). I believe that you owe Mr Patton-Smith an apology - along with all the other readers who feel the same way about this and feel that they, too, have been insulted.

G Smith, Hemel Hempstead

Let's get one thing out of the way first - I'm going to send you a fiver for your letter, because you have clearly gone to some effort to research the point you wanted to make and have written to me in a polite and non-threatening way.

Clearly, sir, you are not a plonker. Nor are all the people who write to me and add a postscript like 'please can I have a fiver' or 'if I win a fiver could you send it to this or that charity' - they are in no doubt as to how I run my letters page (and about half of my correspon-

dents try to boost their chances of winning some dosh in this way).

But your comment about 'deliberately setting out to deceive' is a bit out of order. As is the criticism about 'cheap pages': you may think I'm a cheapskate, but I'm not cheap! When you add the fivers I give away onto my freelance fee for collating, editing and laying out the material, the letters pages are pretty flipping expensive as far as *Express* is concerned.

H F-W

■ On-Line fan

It was stated in *Express* 117 that the full potential of radio, television and personal computers could not be realised until each medium was able to exploit its own unique capabilities. I would say that it was the price factor rather than the capabilities that has made these products successful.

When each of these products first came out, they were grossly expensive but as more people bought them the price came down, so even more people bought them. This was very much the case with computers, and I feel this is now very much the case with modems.

The early days of the acoustic coupler and 50/50 or 300/300 baud comms have all but gone. Now, the standard is 2400 baud Hayes-compatible and every on-liner's dream is a 9600 baud HST. The main problem is price - and there are still a lot of home users out there running up huge phone bills with V21/V22/V23 kit. A standard 2400 modem can be had for £170, or so, but the ultimate HSTs are still way out of most people's league at £800 plus.

The potential for on-line communication is endless. I'd like to see the day when you can log on to all kinds of different stores, order goods and have them delivered to your door. Maplin already have their CASHTEL system and all it needs is someone like Sinclair to bring out a modem and terminal package at a low price, maybe one that could play a few games too, and we would have a modem revolution. It would also have to be simple

to use - ask anyone about the first time they used a modem and they will tell you some interesting stories!

Graham Parkin, Gateshead

Personally, I blame Telecom (cue howls of protest from eagle-eyed Telecom public relations people). The scenario you propose is already up and running in France, with their Minitel system, and could easily have been the norm in this country. But for Telecom.

H F-W

■ Ten things

Here's a list of ten things to do with a SAM Coupé:

- 1) Program in SAM BASIC - probably the easiest programming language this side of AMOS, far better than Beeb BASIC
- 2) Program in machine code - with all the BASIC commands like PUT and ROLL in ROM subroutines, mash programming is easy. The ROM calculator makes floating-point sums easy, and it's all documented in the SAM Technical Manual.
- 3) Play *Pipemania* - I got my copy for £9, half the price of the Amiga version.
- 4) Listen to some trendy music (from D Gommeren's *Silly Demo*) with 8-channel stereo.
- 5) Use the built-in MIDI to control your keyboard (DIY software so far) - no need to spend £50 on Mastersound.
- 6) Use *Flash* to create an animation sequence. OK, so the graphics won't be up to Amiga standards, but ST or 8-bit owners will still be jealous.
- 7) Buy a £30 sound sampler. How much for an Amiga or Archle?
- 8) Spend £40 on a 1/4 Mb memory upgrade. OK, so this is a total rip-off, but it's an ideal Circuit City project (I've just told Keith P - H F-W).
- 9) Ask for some free PD.
- 10) Spend some of the £200 you saved by not buying an Amiga on a Star LC24 printer.

Marc Broster, Saxilby, Lincs

OK, so the SAM sounds like a real computer, to me...

H F-W

■ Eagle-eyed

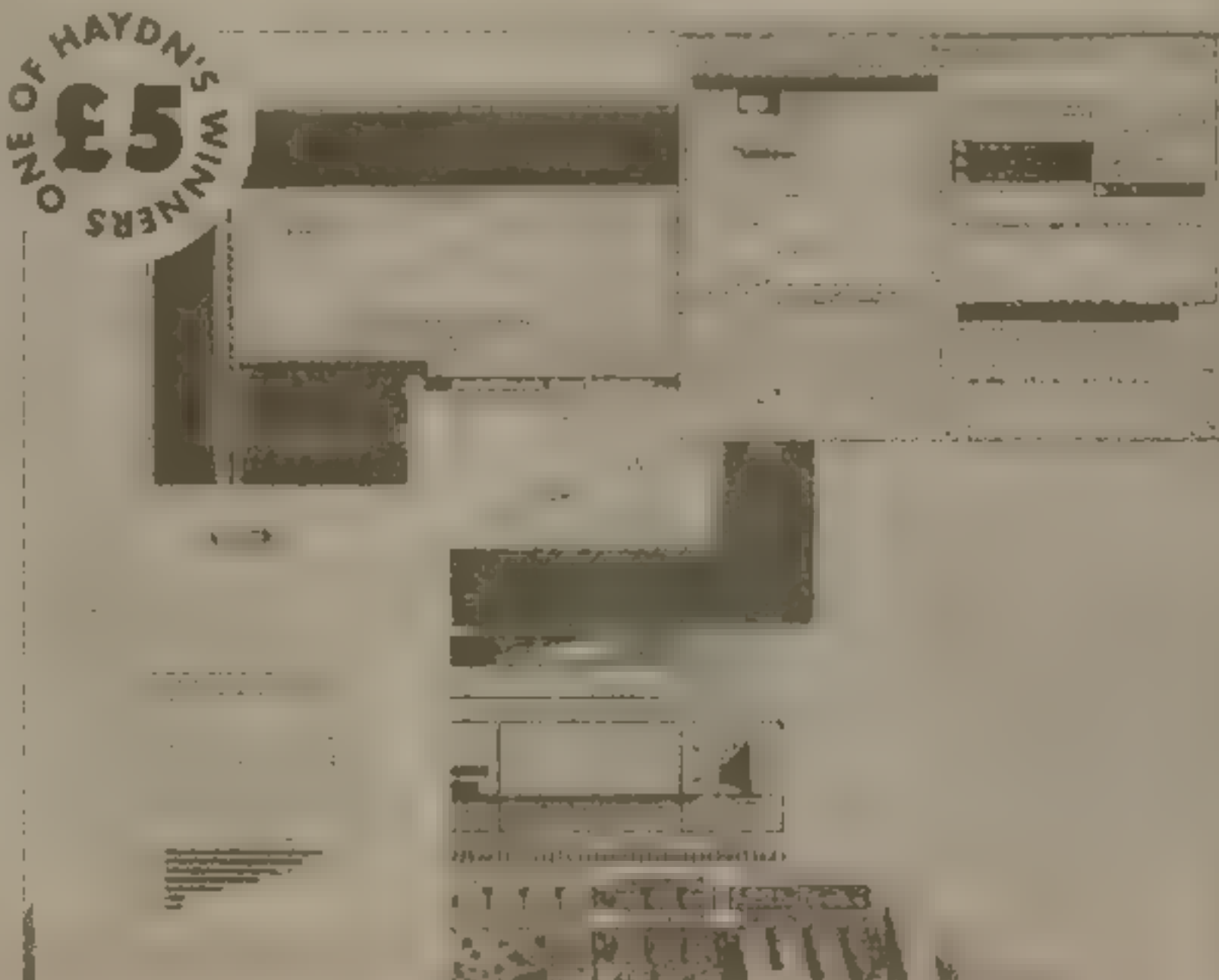
We note with interest that the IBM PC featured on the back of the packaging for Microsoft's Windows 3 is actually not powered up - clearly shown by the position of the on/off switch. Yet Windows is present on the screen.

Does this mean that the ever-wonderful Windows is able to draw power from ley lines?

Phil and John, from the Quarterdeck art department

I suppose it would be bitchy of me to suggest that it was probably an art person who set up the shoot for the Windows packshot? Yes it would. Well spotted, though boys - take the fiver I'm sending you down the pub and buy Bill Poel a half of shandy or something.

H F-W



MAIL SHORTS

■ Older still

Maybe I'm not your oldest reader, but by the time you read this I will be 79 going on 80.

H Jenkins, Marlow, Bucks

OK - that's enough old readers for now. Let's hear from people who'd like to lay claim to the title 'Youngest reader of *Express*! A fiver for those that arrive with photographs that include a copy of our magazine.

H F-W

■ Happy shopper

Just a quick line to voice my appreciation of two companies, both of which have recently given me exceptional service of late. The first is my local dealer - Digitec of Borrowash, Derby - no matter how many times I pester the manager for advice he continues to provide it.

Then there's Intrasec of Chorley, Lancs. I have found their attitude to be incredibly open and helpful.

B Turner, Ripley, Derbyshire

Restores your faith in the nature of commerce. Doesn't it?

H F-W

■ Killing a joke

I seem to have stirred a little mud in the programmers' pond with my comments! Please, everyone, don't write in smashing people to pieces over this - it was a joke, really.

Gary Thornhill, Doncaster

A joke it may have been, Gary, but one which sparked off a lively debate.

H F-W

■ Satellite spotter

I am writing to say that I have recently seen an Amiga 2000 on TV - it was on AL1 on 4th February on Sky 1.

Ian Harper, Northampton

Well there you go. Computers beamed into every home from outer space. Whatever next?

H F-W

■ Looking for scraps

I ask just one thing: can you give me an address for Mr Else's computer recycling plant as I am in need of a cheap second-hand or reconditioned C64 drive to resuscitate my aged machine.

Neil Davie, Canon Bridge, Ross

He's not your man, I'm afraid. Try *Shopping Express* - place an ad or read out loud.

H F-W



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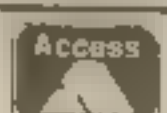
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macintosh

ON AIR MAC

The latest news from Apple is that the company is petitioning the FCC (the American government department which controls the allocation of radio frequencies for specific purposes) to allocate a frequency range which computers could use to communicate with one another.

This, says Apple, would revolutionise computer networking, allowing 'ad hoc' networks to be set up to where individual computers could be moved about but still linked to a central printer, modem or other peripheral. Essentially, instead of plugging your Mac into a LocalTalk cable, you would plug it in to a small radio transmitter, which would then transmit to the other Macs in the area.

OK, this is not too important to us in the UK right now. For one thing, radio networking in the UK will not be possible until the Department of Trade and Industry has licensed a part of the radio spectrum over here. But where the Americans lead, the UK often soon follows... And, as well as networking companies' computers, radio links would open up fascinating possibilities for portable or notebook computing. Imagine being able to wander around the home with a hand-held terminal, dictating your thoughts, the time communicating with your Macintosh. Dead exciting stuff. Watch this space...

from a standard Apple monitor (it would lack definition and colour clarity), but for those who already own a PC with a VGA screen, it could be a cost-effective solution. Apple is supplying pin-out details to third-party manufacturers, so watch for adverts for cables soon.

LOW-COST DTP

With Macintosh page make-up programs such as QuarkXPress and Aldus PageMaker running in at around £700, it's not surprising that few Mac Classic owners have been buying them - after all, the programs cost over two-thirds the price of the Classic 2/40. But Aldus is set to bring out a new DTP package, Personal Press, which could change all that. Costing £195, and expected to be available within the next two months, the program is aimed at novice users of DTP programs. Included will be the traditional page-layout tools, made easier for people who aren't too familiar with traditional layout - terms such as kerning, tracking, leading and so on will be explained in nice, simple language for those who don't find speaking in typesetting terms to be second nature.

Personal Press will work on any Mac with at least 1Mb of RAM and either two floppy disk drives or one floppy and a hard drive. As soon as a review copy is available, I'll be taking a look at it.

POWER FAILURES?

Owners of the new Macintoshes should beware of using third-party peripherals which draw too much power from the Mac. Because the new machines have a fairly wimpy power supply (to save money), some third-party disk drives draw more current than the supply is capable of delivering - resulting in data corruption or even a Mac whose power supply goes 'foom'.

Apple dealers suggest (of course) that you stick to factory-fitted drives supplied by Apple, but for those of us who want more than the 40Mb drive supplied, the only real advice is to buy

VGA MACINTOSH?

Reports in the American magazine MacWeek suggest that the Mac LC may work with PC-compatible VGA monitors. According to Bill Goins, the Mac LC's product manager, VGA compatibility is being treated as an "undocumented feature". He said that Apple tested the LC with 15 VGA monitors, and it worked with 13 of them. But he stressed, "we can't guarantee that it's going to work with your monitor".

The image from an LC using a VGA monitor is unlikely to be as good as

POSTCARD FROM AMERICA

Get ready for some EXPository reportage! The latest Macworld Exposition is finally finished, and is now sitting in packing crates. My ailing feet have yet to recover from the marathon of exhibits, demonstrations, and parties.

This was one of the best Expos of the past couple of years. Interesting software, games, and multimedia-related products have elbowed their way into the show, slipping in between the business-only spreadsheet networking database crowd. Only the most jaded of Macintosh nuts left the show with wallets intact.

Outside the Moscone Center, a couple of sharp entrepreneurs were flogging some really cute sweatshirts. A famous anti-drug advertisement shows an egg, saying this is your brain. The egg is cracked and dropped into a frying pan, this is your brain on drugs. The sweatshirt puts the Apple logo for the brain, and the IBM logo for the drugs. Any questions?

System 7.0 was hot on the lips of the 70,000 faithful pilgrims attending the

Expo. I caught Paul Husbeth, Apple's System 7.0 Product Manager, climbing out of a bus that shuttled between the two downtown show sites. He was travelling incognito, and had asked his seat-mate about the upcoming system software. "He was right on the mark," Paul said, with only a few lapses in the more arcane details. The first beta of System 7.0 (7.0b1) is more stable than the final release of Microsoft Windows 3.0, claim developers working in both environments.

Life pushed its way onto the video-board displays in the SuperMac and Radius booths on Saturday. The mob thinned a fraction because of a 49er playoff football contest, our beloved local team. Dozens of hybrid Macintosh/Sports fans clustered around monitors filled with spreadsheets, graphs, and the ball game. The harsh icepick of the mundane kept popping up on the desktop - news flashes from the Congressional vote on war with Iraq. Talk about virtual reality!

David Morgenstern

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from a reputable supplier and try to get some kind of guarantee that it's totally compatible with the Mac Classic. In case you need to know, Apple allows three amps to be drawn by the hard disk drive. So make damned sure you don't buy a drive which asks for more current than that.

SE/30 PRICE CUT?

Rumours are rife of a price cut for the Mac SE/30. Right now, it sits rather incongruously in the Macintosh price range, costing rather more than a Mac IIsi. Sources from the States suggest that a cut of around \$1,000 is imminent, which would translate to around £600 or £700 off the current price over here. Without that cut, it's hard to imagine many people wanting to buy the machine (unless it's just to be used as a file server), but knocking a few hundred quid off the price makes it a more attractive proposition. And the fact that Apple is extremely unlikely to axe the machine from its range in the near future strengthens the possibilities

of a reduction even more.

AND FINALLY...

Are you fed up with Apple's pathetic excuse for a calculator DA that comes with the Mac? Do you crave for a device with thousands of obscure scientific functions which you'll never use but which look dead impressive? Well, if that's the case you should check out the shareware sources listed last week, because there are loads of highly sophisticated ones available, most for just \$5-or-so shareware fee. The one I use is called dCAD Calculator, which has far more functions than I need. I also occasionally use a programmer's calculator called (surprisingly) Programmer's Calculator, which does funky stuff like converting hex to binary and things like that. On the other hand, if you've no self respect at all, you could continue using the DA that comes with your Mac...

Ian Wrigley



WELL 'AND

Tetris was a smash hit on most formats about three years ago, even if the CPC version was crap. (Sorry, but it was). In case you need reminding, the game had you rotating and moving various-shaped blocks as they fell down the screen. The idea was to form solid lines at the bottom which then disappeared, dropping the blocks that were resting on them one row lower. If you didn't keep making lines disappear, well, the blocks just piled higher-and-higher and you had less and less time to manoeuvre those appearing at the top into position, so you made fewer and fewer lines and... in short, it tended to leave you a quivering, dribbling wreck.

Welltris is the follow-up, and it's even worse. If you imagine the screen in Tetris as being a 'wall', Welltris has four of them, forming the sides of a 'room'. The blocks slide down the wall and onto the floor, and it's there that you have to try to form solid lines.

Nightmarish complexity is introduced by the fact that you can slide the blocks from wall-to-wall, and 'fill-in' lines from any angle. But leave a block

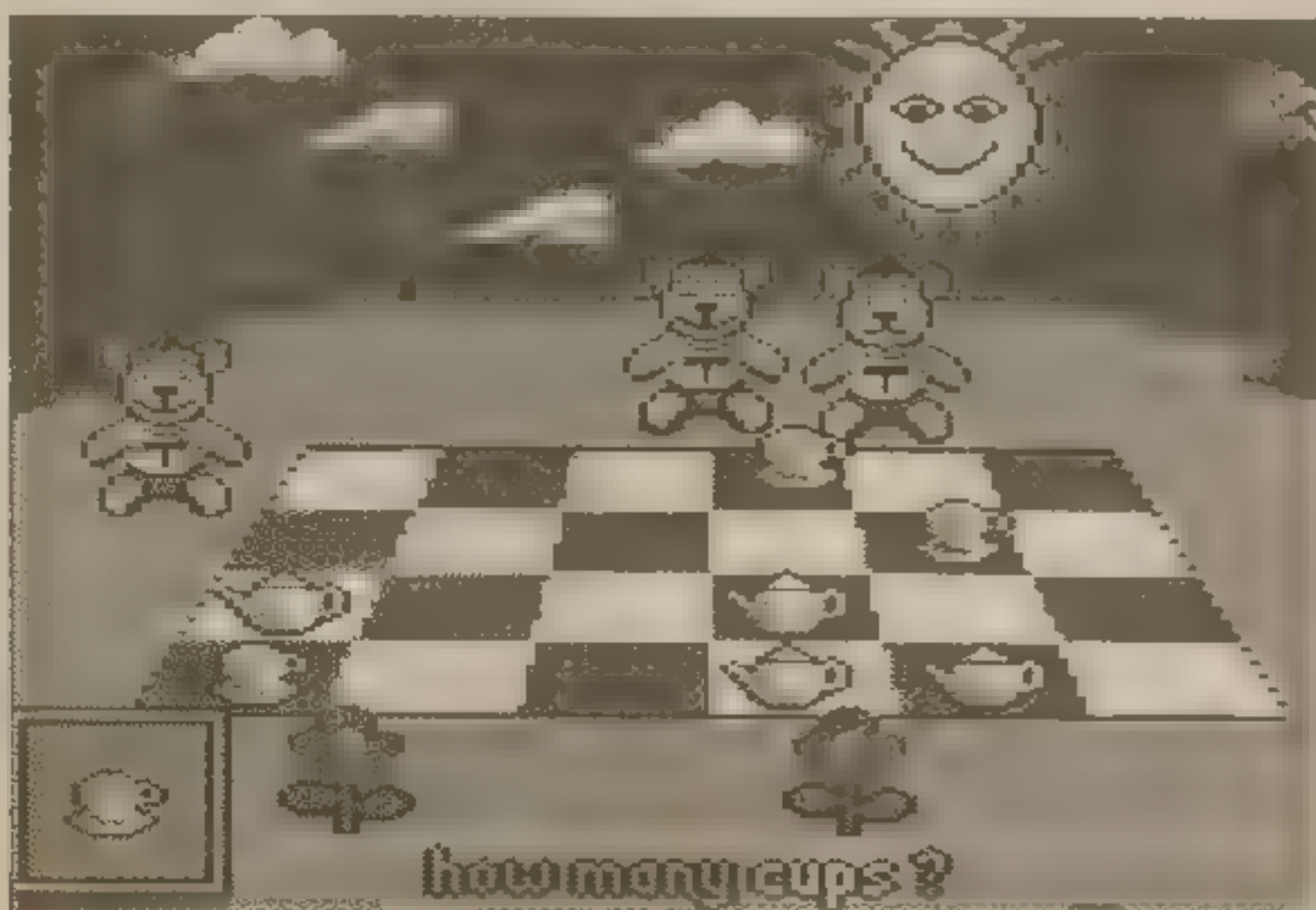
on the floor overlapping onto a wall, and that wall is out of action until three more blocks have fallen. You can select different levels of difficulty where the blocks are different sizes.

Well, having played the original Tetris, I can only warn you that this one will probably leave you as an absolute basket case...

FUN AT SCHOOL

I've had time to take a proper look at Database's Fun School 3 now, and I'm convinced it's the best early-learning program you can get. Mind you, I probably would have said that of Fun School 2, as well, but this latest version is substantially better than even that chart-topper.

Fun School 2 has sold an incredible 250,000 copies across all formats, and in December 1989 hit number one in the charts. Quite an achievement for an educational program. The buyers are impressed too, to such an extent that Database is finding they are coming back for the higher-age group versions as their children grow older. For this reason, interest in the new release has



• C'mon then, how many cups are there? (Clue - you only need the fingers of one hand)

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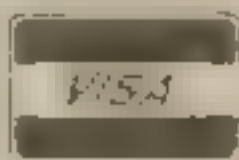
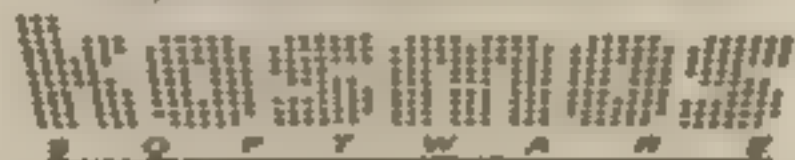
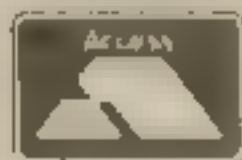
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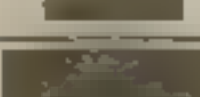
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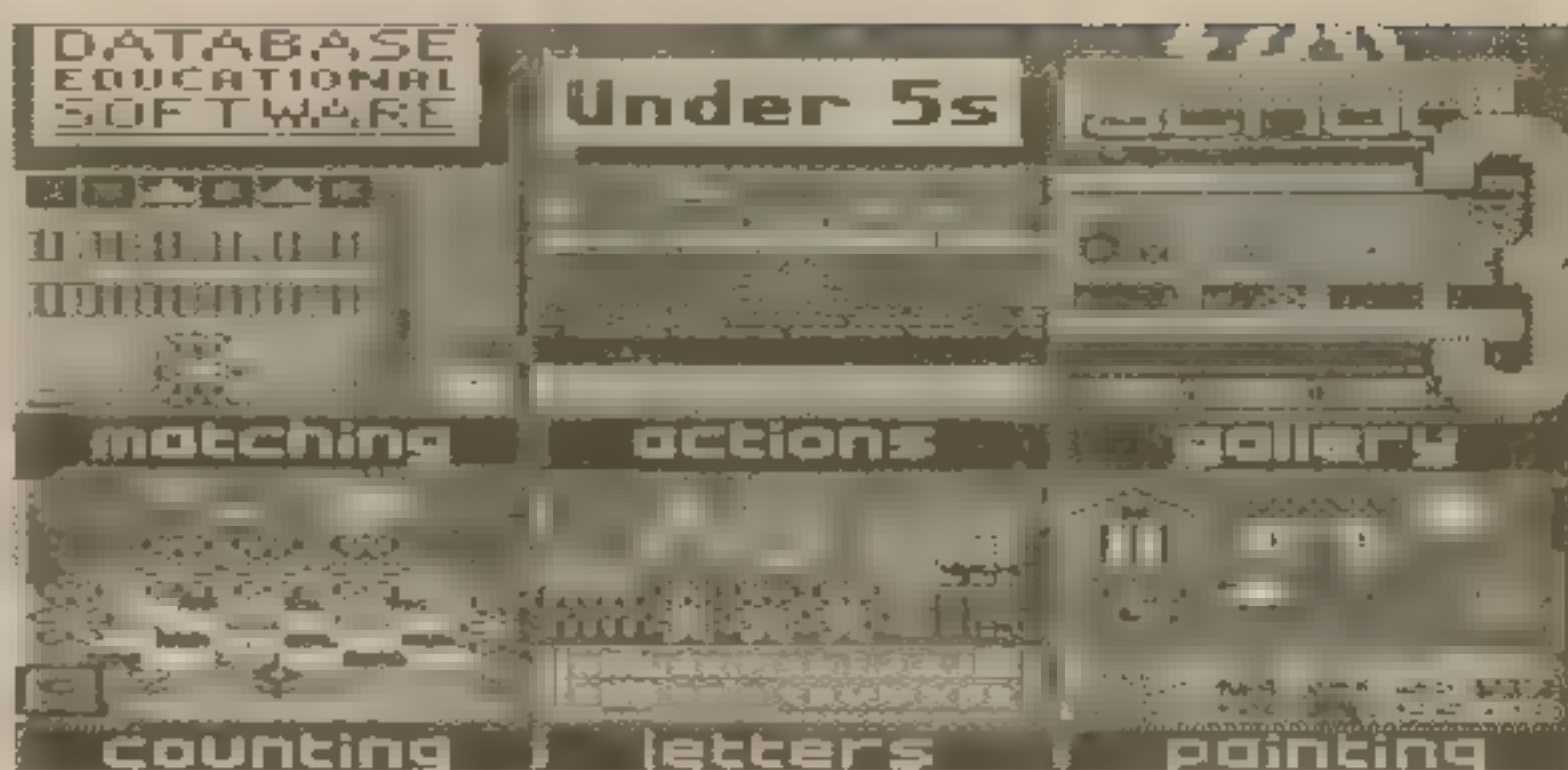
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• Selecting your game couldn't be easier - it's space-bar to cycle through, return to select.

been high too - already 40,000 copies
have been sold.

Three age ranges were catered for
in *Fun School 2* - the under-sixes, six-
eights and over-eights. The software
was put together with the help of
professional teachers, and the whole
thing planned to teach kids the basics of
reading, numeracy and other skills in an
easy and entertaining way. Clearly, it
succeeded! *FS3* improved in that it
now contains material based on the
National Curriculum, and is broken down
into new age categories - match those
specified. These are: under-fives, five-
sevens and over-sevens. It's the
under-fives version that I've been playing
with and learning from.

First of all, although the graphics in
FS2 were fun, *FS3* are miles better.
They're large, colourful, well-animated
and contain many humorous touches.
Your principal character is a teddy
bear (ahhhh...) which appears in all of
the games.

You start off with a menu screen
offering you the choice of six different
games. Firstly, there's *Matching*, where
the aim is to match identical shapes.
Succeed, and a coin is dropped into
your piggy-bank (teach 'em young, that's
what I say!). Second is *Actions*, where
you can make teddy perform any of a
series of actions printed at the bottom
of the screen. Third is *Gallery*, where
you... er, I mean the child... must
attempt to match labels with pictures.
Fourth is *Counting* - here you're
presented with a little rural picnic scene
populated by ever-increasing numbers
of teddies (no, it's not what you think),
flowers, trees and teacups. The child
has to correctly count the numbers of
each. Fifth is *Letters*, a simple game
that gets you to match a letter from the
alphabet printed below. Finally, there's
Painting. This is where you really get to
let your hair down, colouring a farmyard
landscape any colour you want from a
menu at the bottom of the screen.

Most of the games consist of three
or four levels, and success is always

rewarded. For example, when you count
the number of objects correctly in
the *Counting* section, a between-level
screen shows your teddy climbing
another step up a flight of stairs
towards a pot of honey.

Fun School 3 is not a terribly
serious educational package, but
learning at the age of five is not a
terribly serious business - and neither
should it be. With the aim of trying to
teach kids basic skills as painlessly as
possible, Database have gone one
better - they've actually made the job
hugely entertaining. You won't have to
strap your kids down in front of this
one, you'll have to drag them away!

Fun School 3 is £12.99 on
cassette, £15.99 on disk. That's a
couple of quid more than your average
ninja megadeath hack-'n-slash effort, but
there's plenty of value in it. Look out for
it in the shops now.

ART PRICES CLIPPED

Goldmark Systems introduced a clip-art
package called *Graphics Galore* a few
months ago. The idea was that its
various graphics (all of which were
converted from the public domain)
could be imported into DTP programs
like *Stop Press*.

Well now Goldmark has found a
way of reducing the cost of converting
those PD graphics to CPC format, and
also has rearranged its pricing structure
so that graphics catalogues are now
bought separately. As a result, the cost
of the company's various clip-art
libraries has fallen drastically. The price
for each library (some 50 or so pieces
of clip-art is now reduced to £3.00 plus
the cost of a disk and P&P - £3.50.

£6.50 still seems plenty for a
single clip-art library, but you can get
several on a single disk, so bulk-buying
should pay off.

For a 40-page clip-art catalogue
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Rod Lawton



CALIFORNIA DREAM MACHINE

Do you feel limited by the A500? Wish
you could get your hands on all those
lovely widgets that A2000 users have
to play with? If so, then California
Access may be worth talking to.
They've launched an expansion console
for the A500 that promises expansion
possibilities previously unheard of.

A Hi-Q Tower system it may not be
(see *Express* passim), but the Bodega

Bay (catchy name, eh!) modular
expansion console is a fairly
inexpensive way of adding 2000-like
expansion capabilities to your 500. One
nice feature of the Bodega Bay is you
don't need to tear your Amiga to pieces
to use it. The console sits comfortably
over the Amiga, forming the illusion of a
single unit. Bodega connects to the
Amiga via the expansion slot along the
left-hand side of the machine. Other

devices which the Bodega can hold are connected directly to the A500's rear expansion ports.

Bodega's claim to fame is undoubtedly its impressive expansion capabilities. For starters, there's room inside the top level box for you to install up to three different storage devices including both 3.5-inch and 5.25-inch floppies, hard drives, tape streamers and even the forthcoming CDTV-compatible CDROM drive from Commodore. This is usually where most expansion consoles stop, but California Access has built in Amiga 2000-compatible expansion slots which will take most 2000 cards including the infamous Bridgeboard.

Bridgeboard support doesn't stop here, however. CA has also built in three PC-compatible expansion slots for connecting up such things as PC video cards, hard drives etc. Expansion doesn't stop here either. CA has announced that an upgrade will soon be made available to allow the Bodega Bay to take advantage of Amiga 2000 video hardware such as genlocks etc. All this hardware will obviously need the computer equivalent of a nuclear power station to drive it, so CA has built in a fan cooled 200w power supply.

No one could blame you for having never heard of California Access, but it's a big name in the States. Unfortunately for us, it has remained largely US-based, but I'm sure it's only a matter of time before some enterprising UK distributor takes on CA's impressive range of 'Maibu' SCSI controllers, 'Catalina' memory expansion daughter boards and, of course, the Bodega Bay expansion console. If you can face the phone bill, then why not try phoning California Access directly on this number 0101 408 378 0340.

VIDEO VISUALS

If you're into desktop video, then you'll be interested in a range of video devices from Cornwall-based ACT Electronics. ACT produces a range of video enhancers and processors that are sure to be of interest to Amiga video enthusiasts. ACT's products were originally designed for home video-camera enthusiasts, but the advent of powerful 'video workstations' such as the Amiga has opened up an even greater market for what are undoubtedly some very useful products.

As any desktop-video enthusiast will tell you, one of the greatest problems of working with video signals is the inevitable loss of picture quality when transferring video material from one deck to another (especially if you're using VHS decks!). Professional video engineers have access to devices called Time Base Correctors which (amongst other things) ensure that the picture quality is kept to as high a standard as possible.

Sounds just the thing, doesn't it? Unfortunately these are not at all cheap - it'll cost you at least a couple of hundred pounds just to hire one of them! If you suffer from the video blues, then ACT's VE-1 Video Enhancer may be the solution to your problems. For just £50 you get a handy device which will allow you to transfer video material from source to destination (via a genlock) without degradation of picture quality.

This is because of the VE-1's powerful colour saturation and detail controls, ACT claims that it is possible to clean up a video signal to such an

extent that it is actually better quality than the original video signal.

What makes the VE-1 so powerful though, is it its built in SyncPulse Restorer which acts as a sort of mini TBC (Time Base Corrector) unit. This works by stripping the sync pulse signal from any incoming video source and then generating and mixing in its own, hereby resulting in a considerably more stable signal. ACT also produces more powerful video processors which include such facilities as full audio mixing, fading to black etc. The cheapest of these is available for just £100. For more information, phone ACT on 0637 881319

BACKUP AND SURVIVE

Hard disks are truly great things. Even a relatively small capacity drive can virtually revolutionise a computer - especially the Amiga - which suffers terribly from painfully slow disk drives and awkward disk-swapping syndrome.

But, as always, there's another side to everything. In the case of hard disks, that extra storage capacity means there's more data to be lost if something does go wrong. Hard disks are on the whole pretty resilient beasts, but there's always a slight chance that your hard disk could develop a read/write error (or, even worse, a hard disk head crash!). When this happens, there's little you can do other than reformat the partition and rebuild it.

The golden rule of hard disk usage is undoubtedly 'Back it up or lose it', but how many of us actually take notice of this? After all, backing up a hard disk can be a real drag (especially if you are the owner of a high-capacity drive). When I recently backed up the two hard drives that I use, it took me well over half an hour (not to mention the fact that I used up thirty blank disks in the process!).

Don't worry though because help is at hand. VidiTools in the States has announced the impending launch of a unique (for the Amiga) backup utility called VidiBack.

What's so special about the £50 device is the storage medium used - most programs of this type split the hard drive's contents into discrete chunks and then dump them out as a huge binary file to floppy, but VidiBack actually uses standard VHS video tapes as its back-up medium.

When used in conjunction with an Amiga TV modulator and a colour video digitiser (you must own both), VidiBack can write data to and from videotape in a similar manner to a conventional tapestreamer. Using powerful compression algorithms, VidiBack can backup a 20 Mb hard drive in under two minutes! With a standard three hour VHS tape, it should theoretically be possible to store a total of over 1.8 Gigabytes!

DISNEY SOFTWARE ARRIVES

It's been a hell of a long time coming, but at long last Disney's Animation Studio software is finally being shipped out.

As soon as the postman has stopped painting Mickey Mouse and numerous other Walt Disney characters with my sample copy, I'll bring you a full review of this exciting animation/paint package within the pages of Express.

Jason Holborn

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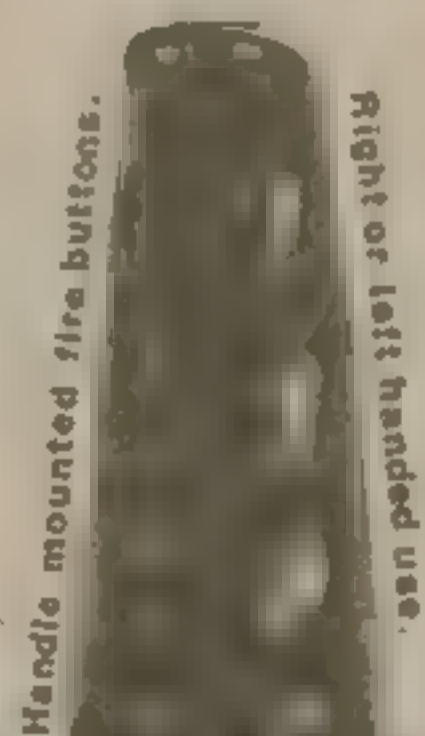
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INTERNAL WORKINGS

One of the most interesting pieces of hardware I've seen over the last fortnight is the internal 20Mb hard disk for the A3000. Marketed by Ian Copestake Software, the idea consists of an absolutely dippy 2.5-inch mechanism - most people's first comment is "isn't it cute!"

The specifications of these drives are constantly being improved, with access times dropping and features increasing; I believe a 40Mb version will be available very soon. Most drives are now auto-parking at power off and some can be configured to switch off during periods of inactivity. It only takes a second or two for them to remount, so you'll hardly notice they've switched off! At £500, the drive is approximately £100 more expensive than an equivalent 3.5-inch external drive, but as yet this is only fully internal A3000 drive. Ian Copestake Software is on 051-648 6287.

THE CHANNEL TUNNEL

What you may say has the Channel Tunnel got to do with the Archimedes? Well to tell you the truth nothing! It's just that a company called The Serial Port is planning a product dubbed - The Missing Link - or TML for short. This is a high-speed data link that uses a small link card plugged into the Econet socket. It will be possible to connect machines together with up to 10 metres of cable (or 3Km of optical fibre) and data transfer rates of up to 10 Mbit/sec are possible. Possible applications include hard disk/file server backup, remote file access and maybe even audio or video communication.

The Missing Link is planned to be released in a number of stages starting with the simple system outlined above. Multi-machine processing or even whole networks with one machine acting as a file server (complete with Econet compatible system calls) are possible future enhancements. Also on the cards, although not 100% definite yet, is a board to convert the Econet socket into a MIDI port, this should only cost about £35. If this goes ahead, and it seems likely, it will be the cheapest way of getting into MIDI.

Also under investigation is the possibility of using it as a simple, but fast, data transfer port. This opens up the realm of multi player games - Two-player Chocks Away for example. Two last snippets from The Serial Port; firstly, it will be opening a dealership in Westbury, Wiltshire and secondly, according to an awfully nice person at Acorn, "Arcterm 7 features the best use of the RiscOS windowing system in 1990". The Serial Port can be contacted on 0243 531194.

WHAT A WONDERFUL WORLD

I know I've been going on about it for a long time, but I think *Wonderland* at last has a fixed released date! According to Virgin Mastertronic, the Archie version is "looking almost finished" (funny that, I thought it had been finished for ages, but there you go...) and is set for a late March launch to coincide with both the ST and Amiga versions.

I am hoping to be in London next week, so I might well pop into the Virgin office to have a look at the game. Who knows, I might even get to cadge a review copy! The only problem with that would be I'd then have to play it and play it until I finished it and I've only just managed to complete *The Wimp Game* (after two or three days continual play)! Boy, that was one weird game - very reminiscent of some of the early Peter Scott BBC games. I'll print a complete solution to *The Wimp Game* sometime in the future, but I know, here's some hints for the later 'rooms':

- Remember the temperature in the workshop.
- Stuck for a password? Tut, tut, it really is very obvious!
- Examine the labels on the bottles in the bar, anything familiar?
- Keep a record of how much everything costs!
- Perhaps Santa would like something to eat and drink...
- Gee, these presents are really strong!
- What exactly are those icons on the desktop? Perhaps this is not such a *WIMP* game?
- Opening the filing cabinets is the tricky bit, but you'll be able to if...you were watching very closely! Virgin Mastertronic 071-727 8070.

8-BIT EMULATORS

The ultimate Archie downgrade - Speculator, is just about almost nearly going to be released. I have heard from Onkar Jagpal of Arxe Systems, that he only needs some information on Spectrum disk formats before the emulator will be ready. I've seen it running and it is rather impressive. All I want now is a copy of *Ant Attack*...Way back in *Express 100* I first mentioned Arxe's BBC emulator that could run *Elite* & *Exile*. Well, it seems that due to some unfortunate incidents in the past, getting hold of the rights to release an emulated version of *Elite* for the Archie may be pretty well impossible.

Negotiations are still in progress - all is not yet lost. The only other bits of games news this week comes from 4th Dimension. I have just seen the new version of *Chocks Away*, and although it is has been called *Chocks Away II* it is not a sequel, merely a re-release with a couple of extra tweaks.

The main criticism of the first release was its speed (or lack of it), this has been improved with a claimed 70% increase in the frame rate. I can't confirm this figure, but it certainly seems considerably faster. The increased speed obviously makes the game more responsive and fun to play, well and truly overtaking *Interdictor II* as the best Archimedes plane game.

Programmer's must not become complacent though, although *Chocks Away* is good, the Archimedes is capable of much more. I have heard from a reliable source that 4D's racing sim *Powerband* is now pretty good.

Early versions were rumoured to be a little on the rosey side. I cannot comment myself as I have yet to see the game, at least it doesn't seem to use the standard appalling 4th

Dimension character set! 4th Dimension can be contacted on 0742 700661

THE ARCHIE SPOTTERS AWARD

As you may well know, Sir Jimmy Saville's chair is renowned for being rather funky — In the latest series of *Jim'll Fix It*, it can be seen dishing out badges right, left and centre by means of a robotic arm. It has a little light mounted on the back and a telephone ■ the arm, it even plays music and talks.

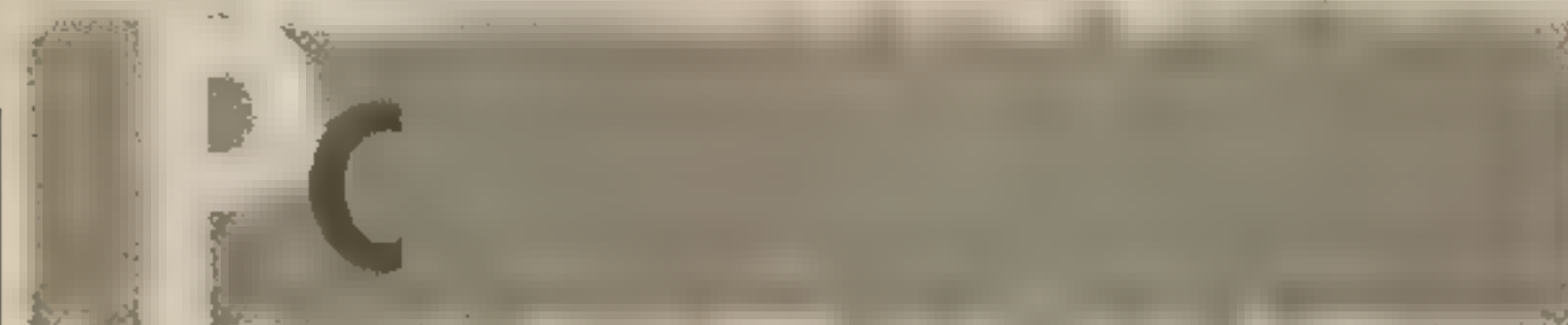
The more observant of you may have noticed the Hitachi 640x200 flat-screen colour display and mouse on the

other arm. Well, if you did, did you think that the mouse is a little familiar? 'Cos you should have done, y'see the whole chair is controlled by, you've guessed it, an Archimedes!

■ Jimmy has to do is press a button on the mouse, the arm (sic) then fetches a badge and the music and speech is played by *Armadeus* and output via the Clares sampler board.

Acorn itself provided this piece of hardware to control the flat screen, hmmm I wonder why they'd go ■ ■ that trouble for just a one off...

Ken Coumarin



PROMPT ACTIONS

You may have come across programs that set environment variables in your AUTOEXEC.BAT file. These take the form:

SET NODDY=BIGEARS

What this line does ■ to create a variable named NODDY and give it the value BIGEARS, though any string is valid. You can create such a variable at any time, try it now. Check that ■ worked by typing the single word SET at the command line. You'll see a display of all the current variables. At the very least you'll get the two system variables PROMPT and COMSPEC, though they may have no values assigned.

'So what?' you ask. Well, why not use these yourself. Here's an example.

If you like playing around with complicated prompts you can save a really juicy one to a variable, or even just save your usual one while you play. The batch file SQZJUICE.BAT:

```
ECHO OFF
ECHO PROMPT %PROMPT%
JUICY.BAT
```

creates a batch file (JUICY.BAT) containing the PROMPT command with the current prompt setting. Running JUICY.BAT at any time will reset the prompt to the value contained in the variable %PROMPT%, which MS-DOS picked up from the list of variables it maintains in the environment. Nice stuff. Even better, save as many prompts as you like by specifying the batch file name like so:

```
ECHO OFF
ECHO PROMPT %PROMPT% > %1.BAT
```

Call SQZJUICE.BAT like so:

```
SQZJUICE P-U-LIKE
```

and it will create a batch file called P-U-LIKE.BAT with your current prompt safely stored away inside.

THE STRANGEST LOOKING MOUSE

That's a title which must be won fairly and squarely by the ICONtroller from Suncom. It's odd-looking for a mouse, but fairly ordinary for a joystick. The ICONtroller is a tiny joystick with a yoke less than an inch high, but it operates as a Microsoft or Mouse Systems mouse. You point the joystick in the



• The ICONtroller from Suncom

direction you want the mouse pointer to go, and off it waddles. The further you push the stick the faster the pointer moves. The 'fire' button on the top of the stick is equivalent to a mouse click; a switch selects which mouse button it simulates. Three mouse buttons are provided, and another alters the sensitivity of the stick.

In use the ICONtroller takes a few minutes to get the hang of, but then using it comes naturally. In fact it is a joy to ■ able to operate mouse-controlled programs like Windows while leaning back in your chair. It really improves Windows Solitaire. Dragging is easy, and it is surprisingly easy to point accurately once you have grown used to the 'vector' way of operating rather than the conventional absolute method.

I had a few problems installing the mouse driver, but these were quickly overcome with some judicious CONFIG.SYS twiddling. In fact the ICONtroller turned out to work perfectly well with a genuine Microsoft mouse driver, which shows that the hardware is genuinely compatible.

This device is ideal for laptop owners who cannot cope with a mouse on the move and find a trackball bulky. In fact Suncom will be producing a special laptop version in its own carrying case with an extendible curly cable. ■ you have a laptop the ICONtroller is a practical mouse substitute.

The ICONtroller costs £59. Suncom who can be reached on 0453 753565.

SPEAK EASY

I have had a demo disk for a while for ■ product called SoftSpeak from Quatech. It allows you to replay digitised sound samples through the loudspeaker of an ordinary PC, without additional hardware. The quality is good, equal to an Atari ST, providing you have a real loudspeaker, not just a piezo-electric buzzer as some do. The program also allows you to edit and enhance the samples.

Quatech is on 091-228 0513.
Stuart Anderton and Steve Patient

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DREDDO RETURN

You might think that six perp'-bashing scenarios would be enough to keep your average civ' perfectly happy but I'm here to tell you, sadly, that there is anarchy on the streets because Judge Dredd doesn't come up to scratch at all. You've got a platform game so smartly wrapped up in Mega City mythology that Fatties dive from levels above you to attempt to put you in hospital, switches to hit - the shape of food dispensers, outbreaks of blockmania to contend with, access to three different kinds of weaponry and of course the Lawmaster bike. All this wouldn't even persuade a smart perp' to steal the game.

The problem is the playability. It takes one hell of a long time to load and this process is broken up into shorter load sequences for no apparent reason. When and if you do get to lay down the law, Dredd has only one life, scores nothing unless he reaches a bonus level and has to contend with a ridiculously rapidly rising crime rate. Unless this is miraculously kept under control, you might as well have loaded a permanently looped Game Over sequence. It's the calibration of difficulty set against reward that's way out of line. Despite some slick (and some not so slick) comic book sequences, deftly designed sprite activity, not to mention the designs of the levels themselves, the Judge is guilty of premeditated unplayability. Be warned.

SOMETHING LIKE SOCCER

Gazza 2 will either have you in tears or stitches. Maybe both. This newcomer to the soccer sim league is in for a grim season, sports fans. You can play in one or two-player mode something that looks from a distance like a computer football game but don't be fooled.

Take a closer look. You can set up teams that have the same strip or even if you have two different coloured teams, it doesn't matter because the chances are that the way your player sprite is identified is usually by way of changing it into the colour of strip worn by the opposition.

Got all of that? Doesn't matter. The goalie lives in morbid terror of ever holding the football and muddy, icy or other climatically derived pitch variations are assigned random ball behaviour modifiers designed to warp

your brain. The whole thing is sort of playable. Don't cry though.

BUNDLE BLISS

System 3 hasn't released much in the way of compilations recently. Perhaps it is feeling left out in an increasingly popular area but, blimey, has it decided to do something about it. A compilation due from them in the next few weeks will contain the original *Last Ninja* and the *Last Ninja Remix* (only recently released itself), *Myth* and others. It may be among the last companies to make this move but its timing probably couldn't be better as there's no competition at the moment. The package looks like it's going to be very good value indeed. We'll just have to wait and see what the final price tag will be.

TEMPUS FUGIT, CHIP

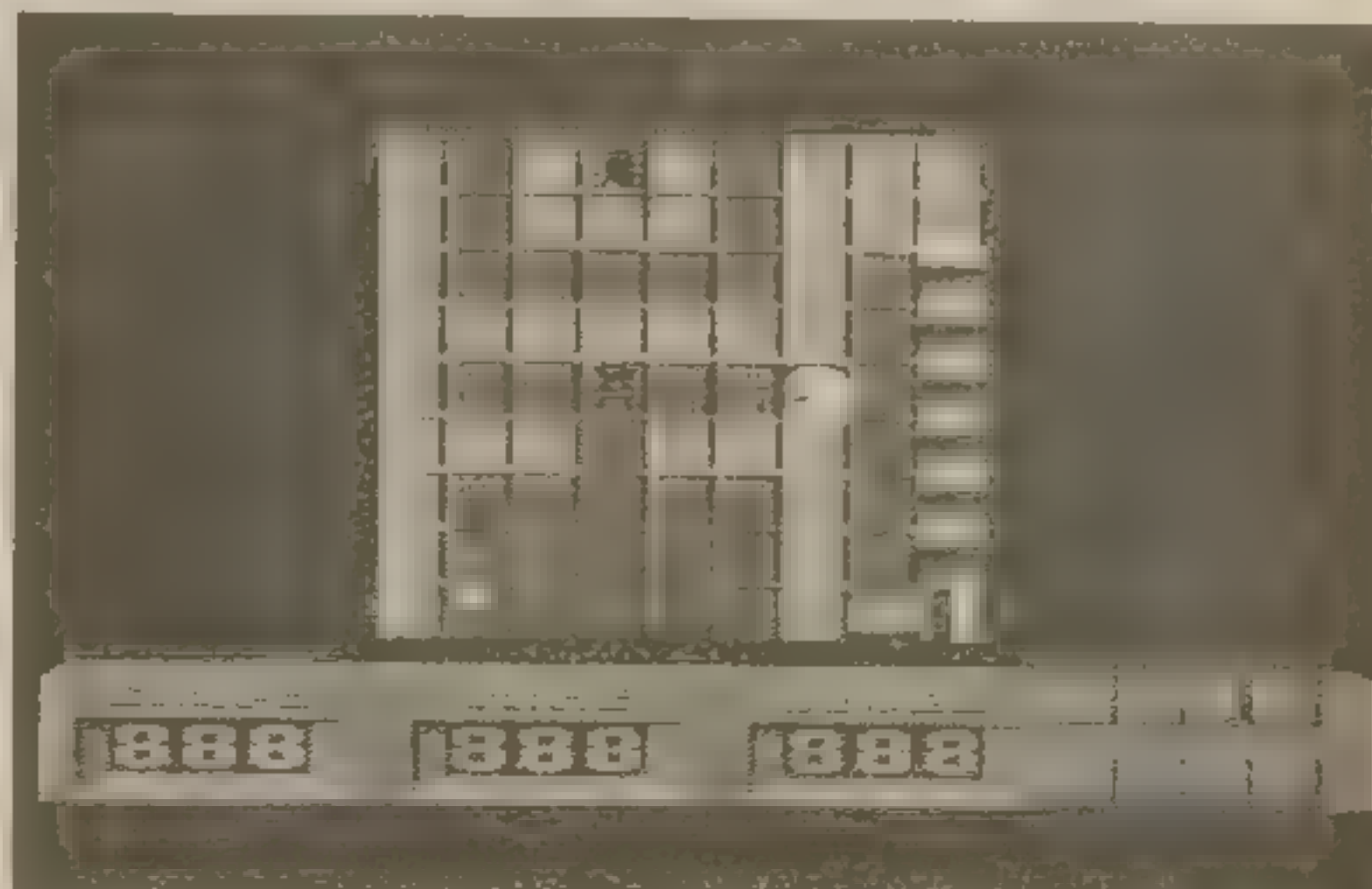
The truly warped among you will find plenty of furious frustration in the vast 150 levels of US Gold's *Chip's Challenge*. This Atari Lynx conversion is almost accurate right down to the size of the screen. The graphics, it has to be said, are something of a turn-off but the game proves wickedly addictive nonetheless.

You control Chip on a labyrinth silicon chip collecting errand, devised by his prospective girlfriend, Melinda the Mental Marvel. Indeed. A key of one colour opens a door of the same hue. Standing on a switch opens or closes other routes. Dexterity alone will get you past the likes of the room-orbiting fireballs. Meanwhile, time is running out. Despite this being an unlikely model of unrequited love, it's a masterpiece of its kind.

SAD ENDING

Fire & Forget II is finally finished and so also is *Line of Fire*. I don't know which of them is better, but I think *Titus' Fire & Forget II* offering probably wins by a small sprite. Neither of these games are much more than a cure for insomnia. Both involve rather repetitive gameplay and static or flat graphics. No doubt these games too will one day find their way onto a compilation. They should in fact be budget priced or, better still, buried deep underground where they can't do any more harm.

Sean Masterson



• US Gold taking the chips out of an Atari Lynx and putting them into the C64.

Spectrum

CHEAPY CHEAP

It's widely known that you can't enjoy yourself on a wet, dark February night for less than £10. If it's a Wednesday and you live in Scunthorpe this problem is obviously compounded. Well, some brave software houses have said "Knackers to that!!" by releasing some absolutely classic cheapos. Try any or all of the following three and experience a guaranteed "Good Time" for less than £10, even on a Wednesday in Scunthorpe. (With any luck.)

WEC IN MANS

(Hit Squad - £2.99.) This arcade conversion really wowed Speccy owning audiences on its release a few years back. It still rates as one of the best Spectrum driving games ever with dependable graphics and most importantly a real impression of speed as you attempt to skid your way around a twisty-turny, upey-downy circuit before the time expires.

The other cars are driven by a combination of Capri-owning boy racers and Robin Reliant Sunday drivers as they conspire to race you off the track or block your path. It's very addictive and pretty damn well essential for anyone who wants to hold their head high and speak knowledgeably in driving game circles.

BATMAN (THE CAPED CRUSADER)

(Hitsquad - £2.99.) This excellent side-viewed arcade adventure was released prior to the official movie version in '89 and features two separate loads worth of puzzle based larks, the first against the Penguin and a much harder adventure sees you taking on The Joker and his henchmen.

The graphics are well drawn in a comic book style with the action taking place in comic strip panels and the whole thing remains faithful to the original character.

This is a superior licensed game and anyone who likes a bit of thinking thrown in with the fighting should go a bundle on it.

TRAPDOOR

(Alternative - £2.99.) Now this has to be one of the biggest bargains for years. Two classic arcade adventures whacked on one cassette for three quid. Both games are based on the fab kiddies

program of the same name and look fairly similar with cute and cuddly big graphics pioneered by the author, Don Priestley. The various tasks you, as a large blue thing called Berk have to complete usually involve lots of animated monsters that crawl out of the trap-door.

People are still trying to work out how to complete these games years after they were written and they both guarantee hours of wholesome fun for all the family.

MUSIC MAESTRO

Calling all funky music making type dudes in the area! Get down! and, er, get back up again because I've just heard about a user group which should really interest you.

The Spectrum Music Club is a club for Speccy owning musicians and aims, according to organiser Sean Sanderson, "to bridge the gap between computers and music making by explaining what the Musical Instrument Digital Interface (MIDI) is capable of." It caters for beginners and experienced musos alike with an impressive quarterly tape mag called Channel.

The issue I saw (number five) was representative of what it's usually like club members are on to a good thing. One side was devoted to some popstastic programs such as a sample editor previously available for £9.99 and various routines and samples for the RAM Music Machine. The flip side was the one you read and included knowledgeable articles on power guitar, MIDI, mixing and portastudios amongst other things.

Club membership is £10 for four issues of Channel and if you're interested in producing music with your Speccy I strongly suggest contacting Sean Sanderson at the Spectrum Music Club, 'Chesters', Chesters Lane, High Bentham, Lancaster LA2 7AN. Rocktabulous! And as the hit parade is seemingly chocka with techno dance records that feature lots of beepy noises who knows where you and your Speccy could end up.

HINTS AND HELP

Lumme! That Mark Harris bloke (AKA Miktor) has been at it again. Forgoing time consuming activities like eating and sleeping he's managed to come up with some more pokes and cheats for us, his



• Keep away from that trap-door.



• Think about the future Bat fans

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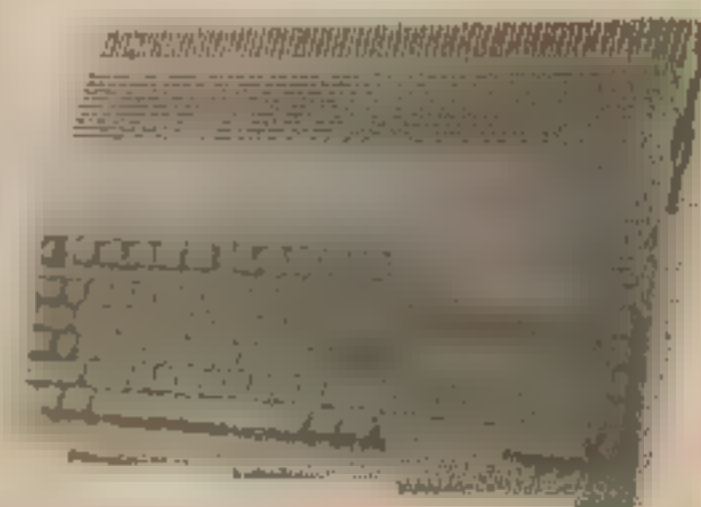
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Specy owning comrades. Enter, Save and Run the following routine and start your *Dragon Breed* tape in the usual way for the prescribed immortality. The Multiface poke for Golden Axe and cheat mode for *Blazing Thunder* should also come in pretty useful.

10 REM DRAGON BREED
(Immortal), 20 CLEAR 3E4: FOR
N=23496 TO 23526
30 READ A: POKE N,A: NEXT N
40 PRINT "START DRAGON BREED
TAPE";USR 23496
50 DATA 221,33,155,238,17
60 DATA 115,16,62,255,55,

70 DATA 205,86,5,48,241
80 DATA 62,214,50,52,254
90 DATA 195,250,238,62,120
100 DATA
50,23,146,195,223,254

GOLDEN AXE Multiface Poke:
46652,0 - CREDITS

BLAZING THUNDER: Press ICE on
selection screen

For those rather handy tips we have
to thank Mark Harris of Faversham,
Kent, Specy owners of the world
eternally salute you!!

Robin Alway

shied away from releasing such overtly
business-orientated computers and
concentrated on the ST range of
personal computers.

Success in the top end business
market would mean that technology
developed for those machines would
filter down into machines such as the
ST. The wider product range would also
mean that the company would be less
susceptible to the inconsistencies of the
personal computer market: today's
wonder computer is tomorrow's
door stop.

You will have read in this week's
news that Atari is just about to drop the
price of the STE down to £299, with the
bundled pack dropped to £399. This
means that the STFM is very close to
being phased out, although with the
massive installed user base, there's no
reason to start worrying about support
stopping from software and hardware
companies.

UPDATE AT ONCE

ATOnce is one of the best PC AT
emulators available for the ST. German
in design, the AT emulator is very fast
and compatible with practically all PC
software. The system software which
controls the board has just received a
major update to v3.5.

The main new feature of the
software is the EGA and VGA emulation
on a monochrome monitor. This means
that high definition graphics can now be
displayed. A new MS-DOS font has been
incorporated in the software which
makes screens considerably easier to

read. What's more, a font converter has
been included which enables you to
design your own or modify any of your
existing fonts.

Perhaps the most interesting piece
of utility software on the disk is
Hyperswitch. This program enables you
to jump between 'virtual' STs, each
running a different operating system.
So for example you could have *Protext*
running from TOS, *Microsoft Windows*
running under MS-DOS and an ST game
running in another portion of memory.
Of course this kind of feature is highly
dependent on the amount of memory
installed in your ST, if you've only got a
520 then you'll need at least a 20Mbyte
hard drive to take advantage of
Hyperswitch.

NOT A GRASS, BUT AN INFORMER

One American software house which
has been busy over the Christmas
period is Soft-Aware, which has just
released *Informer II*. This piece of
productivity software is a data/image
manager which works along similar
lines to the Apple Macintosh program
Hypercard. The program enables you to
produce a series of database cards
which have images connected to them.
These cards can then be viewed in
slideshow form or casually at any point
by just dipping into the pack.

The program enables the user to
input data onto (which can themselves
be images) cards. Soft-Aware claims
that the program combines elements of
word processors, form managers,
report writers and spreadsheets. The

A UNIX BASED ATARI?

News has come from some very
reliable sources that Atari is planning to
release a Unix-based computer.
Apparently the new machine will be
debuted at the computer Messe in
Germany in March. A launch of such a
powerful computer will have many
implications on the future development
of the company.

Unix-based machines typically cost
£4000 upwards and it will be
interesting to see how Atari price its

computer. Unix is an extremely
powerful operating system which
enables computers to interface with
each other quickly and easily. For
example, many mainframes use the
operating system for networking.
What's more, emulation on such a
machine would be extremely easy, so
for example a network of dumb
terminals could run ST software.

However, perhaps the most
interesting aspect of a launch of a Unix
machine is Atari's track record. It has

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obligation to subscribe, but we know
you will be back for more!



The controller wishes you luck before you tackle one of the missions in *Flames of Freedom*.

program comes complete with a conversion program enabling you to use data from other programs on your cards. Soft-Aware Ltd can be reached on the following number: 0101 714 982 8409.

MIDWINTER II: THE REVENGE OF MAELSTROM
Without a doubt, one of the best games ever released for the ST is *Midwinter*. Addicts of the game can start breathing a little easier now though, as the sequel is nearly with us. I recently nipped up to Liverpool to see the Maelstrom team at work, finishing off the game.

Mike Singleton, the head programmer (one of the legends of computer gaming) was putting the

finishing touches to the new underwater sequences of the game. *Midwinter II: Flames of Freedom* isn't so much a sequel as a completely new game. For example in the original you were stuck on one island, in *Midwinter II* there are 42 (yep, 42) islands to explore, each with its own mission and over 20 different kinds of transport to get you between them. The transport ranges from trucks and jeeps right up to zeppelins and submarines.

Having played around with an unfinished version of the game I can assure you that this is going to be one of the games of 1991. If you do buy the game then check out the island of Henet, as its mission was designed by yours truly (and I've made it particularly hard, ha ha). Release date for the

program hasn't been decided yet, but should be around the end of February to early March.

A VERY BIG PLUS

Bucking the trend for sequels, updates and follow-ups, Rimik Enterprises has released a brand new piece of software called *Menu Plus*. The American company reckons that the program is a major 'Desktop enhancement'. Install it and you can launch programs from your floppy or hard drives, from one menu, without having to root them out of their respective drives and folders.

The program enables you to set up a main menu, say Games, and from this would be sub-menus detailing each game on your drive. The software which only uses 30K of memory also enables you to view Degas and Neo pictures, or view a text file. Sound files, containing samples can be listened to from within the program and system settings can be modified. Rimik Enterprises, 0101 619 630 1217.

MOUNT YOUR SPECTRE

One of the most interesting aspects of the recently updated Mac emulator Spectre GCR has just been brought to my attention. Apparently the cartridge can do something a real Mac can't (large raspberry).

To use the DOS mounter on a Mac you need a 1.4 Mb drive to be installed. Use Spectre and you can use it with a standard double sided Atari drive. The DOS mounter itself enables

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AND OF COURSE THE NEWS AND FEATURES PAGES. THERE'S SOMETHING FOR EVERYONE IN EXPRESS EVERY WEEK

you to insert MS-DOS disks straight into your ST under Mac emulation (previously you had to use a converter program). Just one more of the many reasons why Atari make such wicked computers.

AND FINALLY: DON'T CALL US

A slight error crept into last week's column. MPH software's phone number is 0603 503382. The company, who deal with TCB Tracker, the Ultimate Ripper cartridge and their new, fab and groovy Stereo sound cartridge, tell us that there's a very irate little lady in Berlin who is very worried about all these British people asking for an Ultimate Ripper! Apologies Fraulein.

Andy Hutchinson

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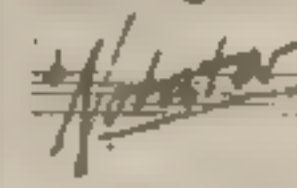
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520STE TENSTAR. consists of Standard Pack and Asterix, Chess Player 2150, Driving Force, Live & Let Die, Onslaught, Pipemania, Rick Dangerous, Rock n Roll, Squeek, Trivial Pursuit II and a joystick	£349.00	£369.00	£419.00	£519.00
520STFM STANDARD. consists of the computer with mouse, tv lead, manual and all connecting leads etc. The Standard Pack is supplied with NO software.	£245.00			
520STFM DISCOVERY. consists of the Standard Pack and STOS, First Basic, NeoChrome and 4 games (Carrier Command, Space Harrier, Outrun, Bomb Jack) and a joystick	£255.00			
520STFM TENSTAR. consists of Standard Pack and Asterix, Chess Player 2150, Driving Force, Live & Let Die, Onslaught, Pipemania, Rick Dangerous, Rock n Roll, Squeek, Trivial Pursuit II and a joystick	£279.00			
520STFM BUSINESS. consists of Standard Pack and also comes with K-Word 2 word processor, K-Data database, K-Spread spreadsheet and Metacomco Basic programming software.	£299.00			

STE RAM KITS

DIY 1 KIT - 520STE to 1MB
(2 x 256K cards) £34.99

DIY 2 KIT - 520/1040 to 2MB
(2 x 1MB cards) £109.00

DIY 4 KIT - 520/1040 to 4MB
(4 x 1MB cards) £205.00

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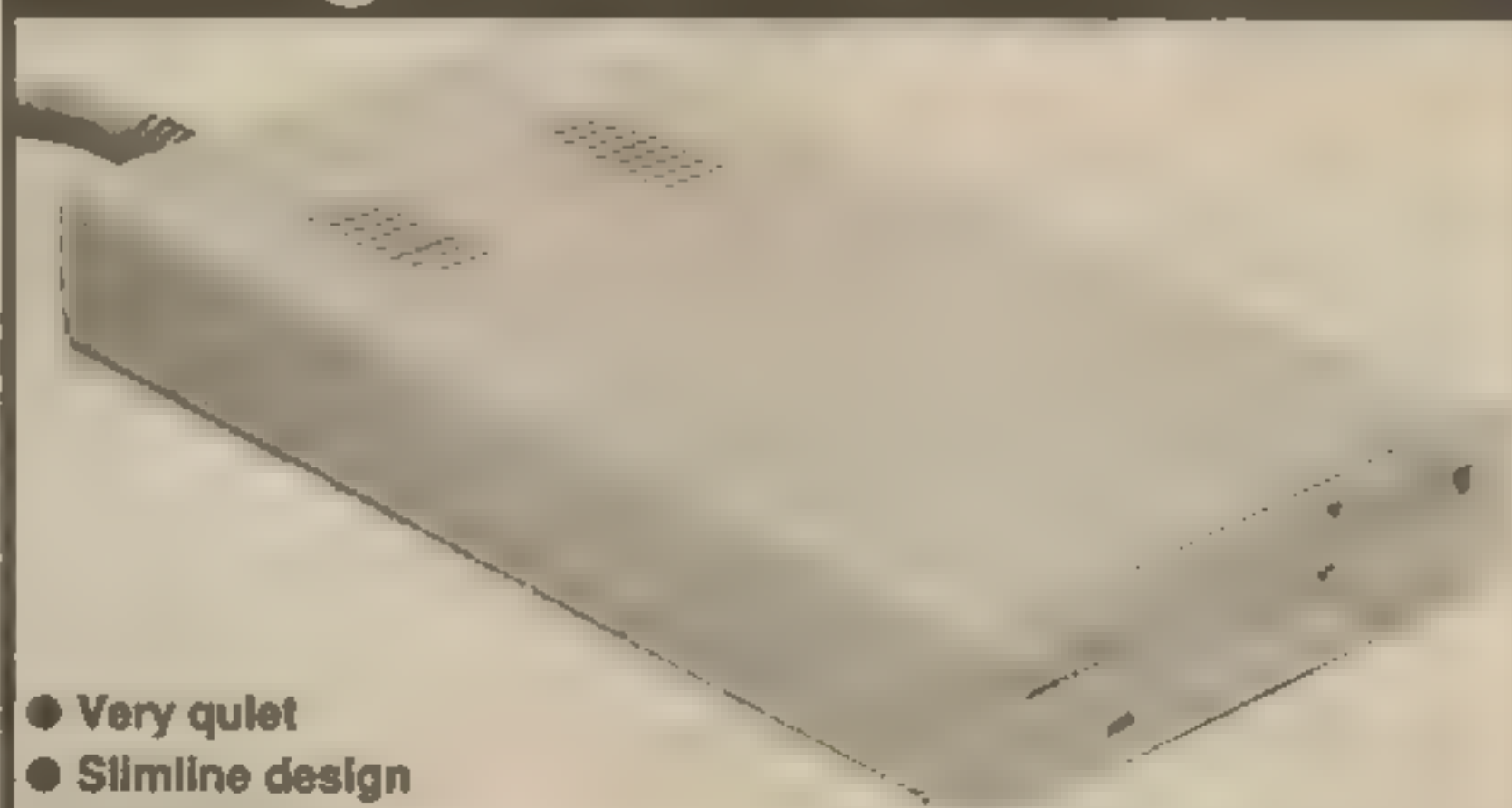
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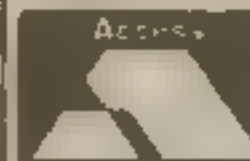
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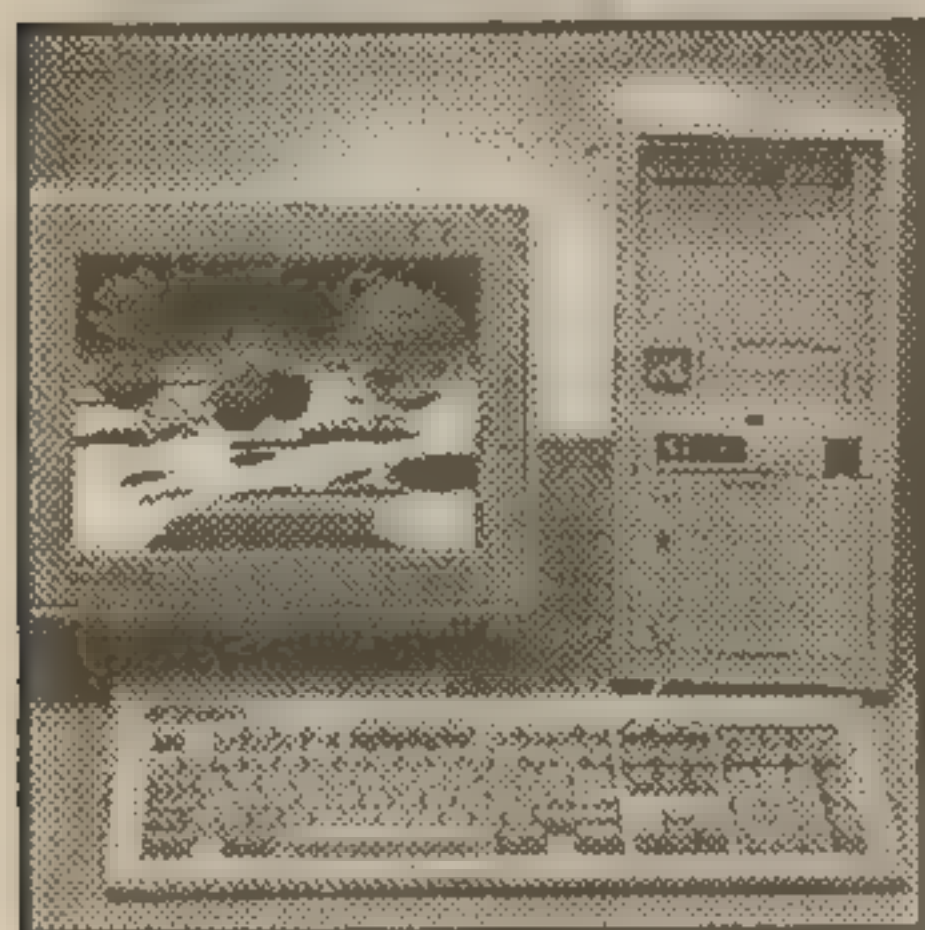
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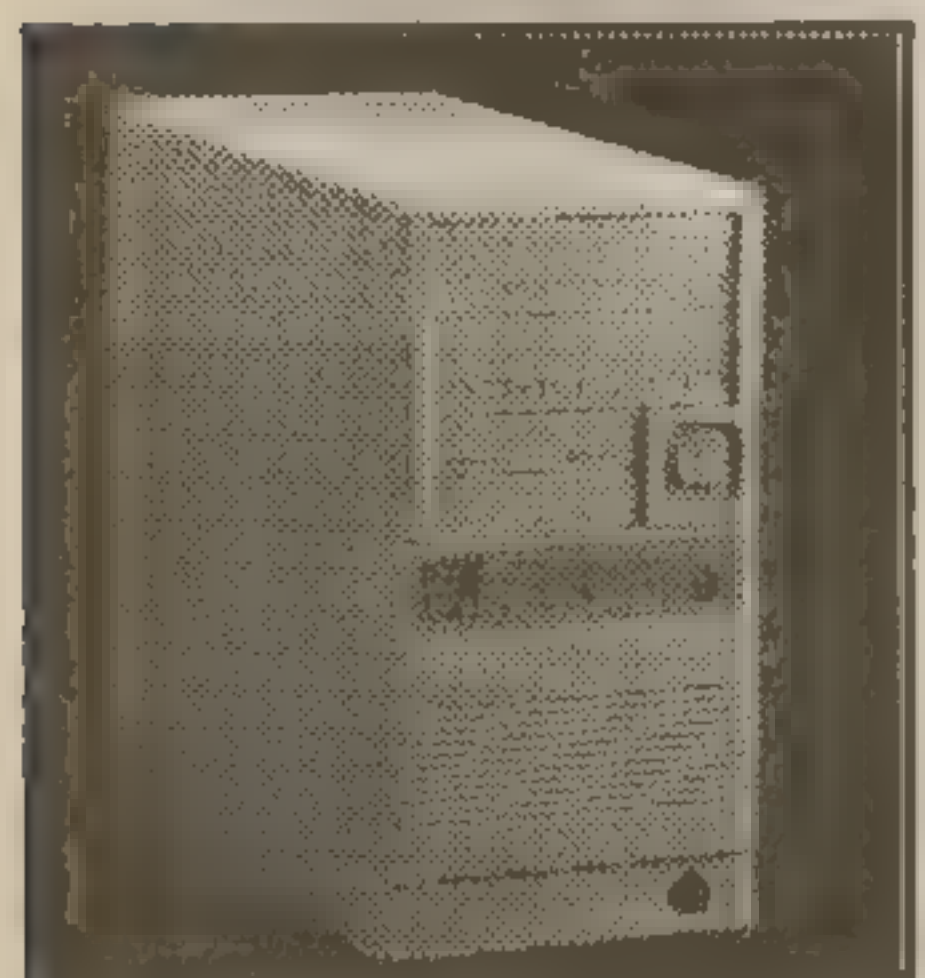
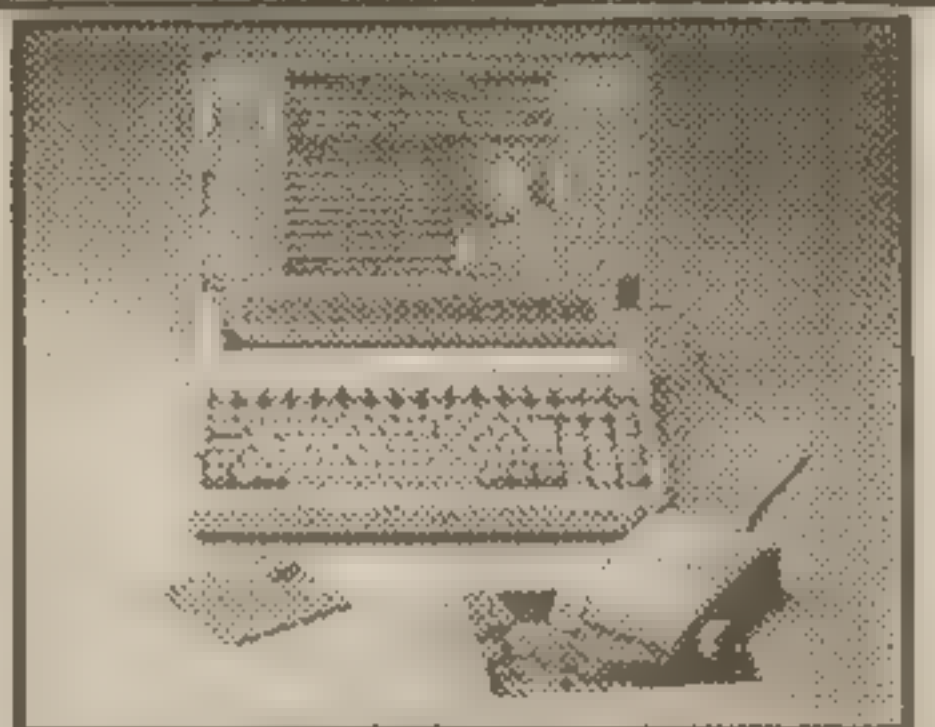
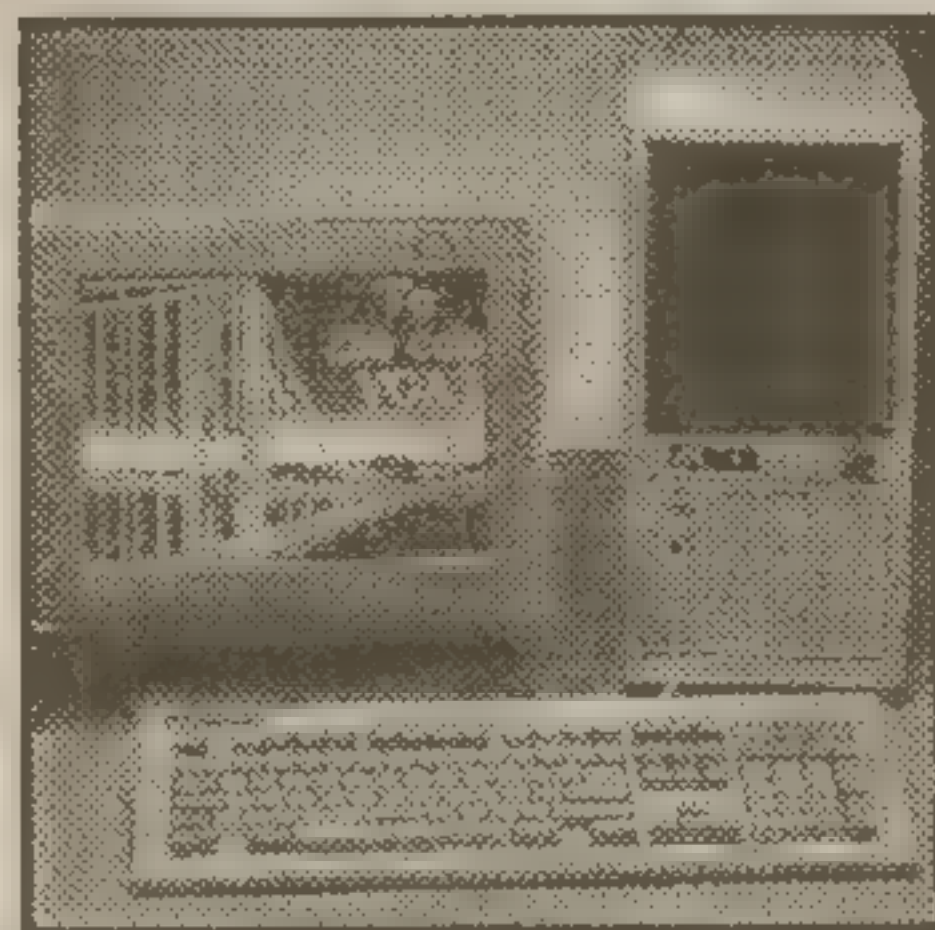
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TIME

Numbers they're not what they once were. Without many of us even realising, they have stopped being tedious little squiggles on blackboards - chalk lines which seemed have some bearing on two men, two buckets and one bath. They have become the staple of modern culture.

Numbers have started to become fashionable. Take any three bands from any Top Twenty chart and you will soon discover that numbers probably played a greater part in the recording of the hit song than anything else. Look at the T-shirts which will be worn in the sluggish approach of summer: they will be adorned with one of Benoit Mandelbrot's patterns: numbers are

The main reason for this massive change in our culture is that computers have been able to animate numbers in a way and at a speed which was previously unthought of. Fine, going along to a lecture given by Newton would probably have injected some zest into numbers, but you would have had to have been a member of the Royal Society to do this. Shove a documentary about fractals on the television with a few clips taken from *Star Trek* and the fractal creation of the Genesis planet and the chances are that millions of people will watch it and hundreds of thousands at least will be turned to computers speed the process of visualising numbers up a point where they seem to take on a life of their own.

God Lord I'm glad I've got all that out of my system. Personally the only numbers I have been seeing this week are the numbers of deleted files on my Mac since some clever person renamed my wastebasket. It's all right to put things in here honest because they'll be safe. Trust my faithful colleagues not to play silly games like that which just goes to show how stupid people can be. Undeleting files from a Mac is supposed to be an easy task what with the various utilities available, at least that's what the salesperson said. I'll tell you how I got on with it all next week. Bye for now.



This week it's a CDTV (Centrefold Direct Television) special courtesy of our that fabled humourist of the late 20th Century, Ian Heath. Ian's new book *How to be a Damned Slight Funnier About Computers than Most People Can be About Changing Lightbulbs* will be published by Centrefold Press in the near future.

Dear Tim,
Here are some more ideas for your new Centrefold Direct Television:

10:00 *The Antiques Road Show* - a nostalgic look at the technology of yesteryear... the Sinclair C5, the National Grid, BSB and so on.

10:35 Adverts by Nintendo

11:35 *Carry on Diskdoctor* - more hilarious antics with the Carry-On team. Sid Games, Alan Sugar, Boobs Windsor.

13:00 Adverts by Amstrad

14:00 *Sale of the Century* (game show) - Les Cruddier cons more innocent contestants into paying inflated prices for a discontinued Century PC complete with tape storage and 78rpm disk-based ROM.

15:00 Adverts by Atari

16:00 *Tomorrow's World* - this week, a look at Sinstrad's revolutionary pocket mini-computer. Ten Mb RAM, 15 Gigabyte hard disk fitted as standard and an integral colour monitor, laser printer and modem. The whole kit and caboodle fits inside a Swan Vestas matchbox and comes complete with pull-along trolley for the rechargeable battery-pack.

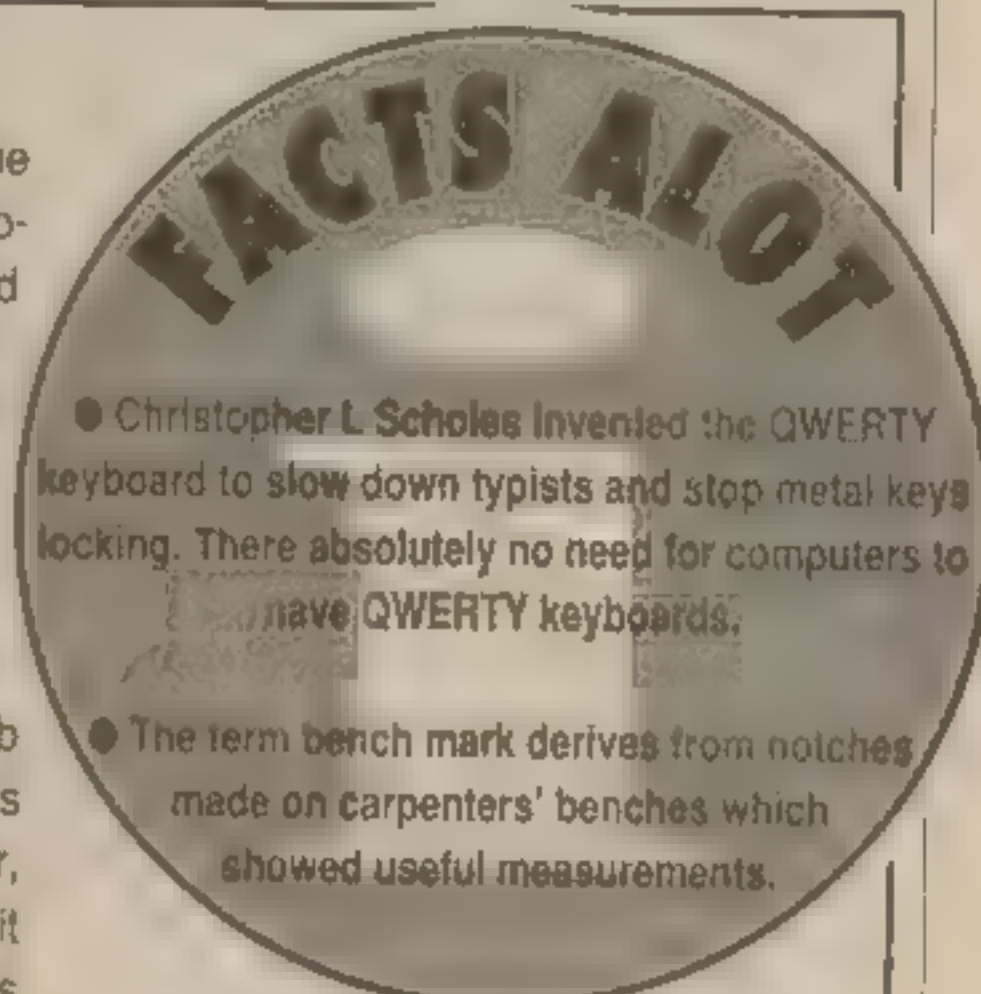
17:00 Adverts from Commodore (Censored)

17:04 *Give Us a Clue* - Once more the panel attempts to unravel the mysteries of Amiga BASIC (third series)

18:00 Adverts from IBM

19:00 *Pete's Dragon* - a film about a firebreathing computer

21:30 *On the Buses* - zany adventures of ROM Butler, a data bus driver, and his sidekick Stan who thinks he's a bit of a RAM.



● Christopher L Scholes invented the QWERTY keyboard to slow down typists and stop metal keys locking. There absolutely no need for computers to have QWERTY keyboards.

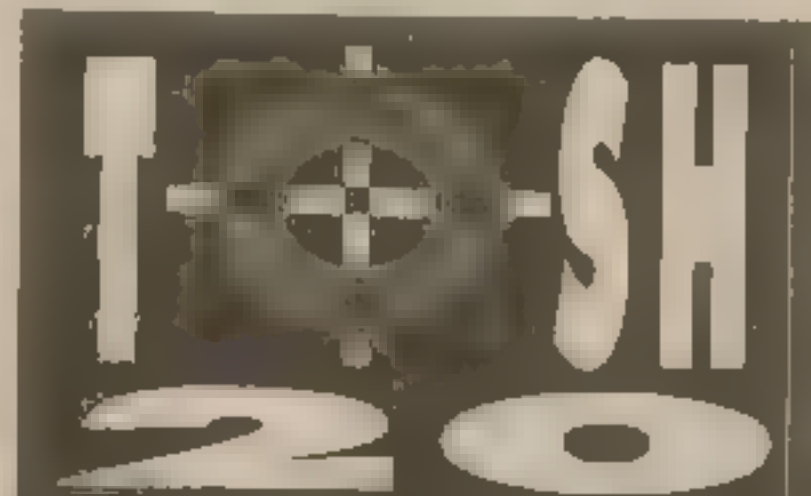
● The term bench mark derives from notches made on carpenters' benches which showed useful measurements.

22:30 *Night Thoughts* - the thought for tonight is "What is that funny smell coming from the kitchen?"

00:30 Close down

Yours, Ian Heath, Wirral

Dear Ian,
Er.... thanks very much



Two lists to ponder in the bath with and remember you get any of them in the eye wash them out with warm soapy water. They're compact but say a great deal about modern computing - the lists that will not you eyes.

TEN BUZZWORDS OF THE LAST FEW YEARS

- 1) Cyberspace
- 2) Fully integrated
- 3) Quality time
- 4) Virtuality
- 5) Nanotechnology
- 6) Phreaking
- 7) Reverse engineering
- 8) Vector graphics
- 9) Windowing

TEN WAYS TO MAKE FRANKENSTEIN'S MONSTER WITH COMPUTER PARTS

- 1) One read/write head
- 2) Two ARM chips
- 3) Two large footprints
- 4) Two legs (paths) near routine subroutine to you mate
- 5) Two optical scanners
- 6) Two EAROMs (Electrically Alterable Read Only Memory)
- 7) One large neural network
- 8) Handshaking ability
- 9) Two bootstraps
- 10) The ability to face down feed

WEST GERMAN
WORLD CUP WINNERS
WERE ROBOTSA CENTREFOLD
EXCLUSIVE

Late last night news broke of digital doings in the West German international football team. Despite a FIFA cover-up which included such outspoken footy-figures as Hans Jurgen-Smurgen of Dusseldorf Rovers, Gian Luca Dispicabo of Dynamo Majorca and Alf Jones of Twyford Old Inestimables, it can be told that the entire West German side were cyborgs programmed by Franz Beckenbauer. I was able to gain vital details from a reliable source behind the coffee machine at the annual general meeting of the Crewe Subbuteo/Striker league and convention.

● Lothar Mathias' feet were controlled by an 486 PC

● Jurgen Klinsman's pace was provided by a tape streamer built into his boots

● Franz Beckenbauer programs in LISP

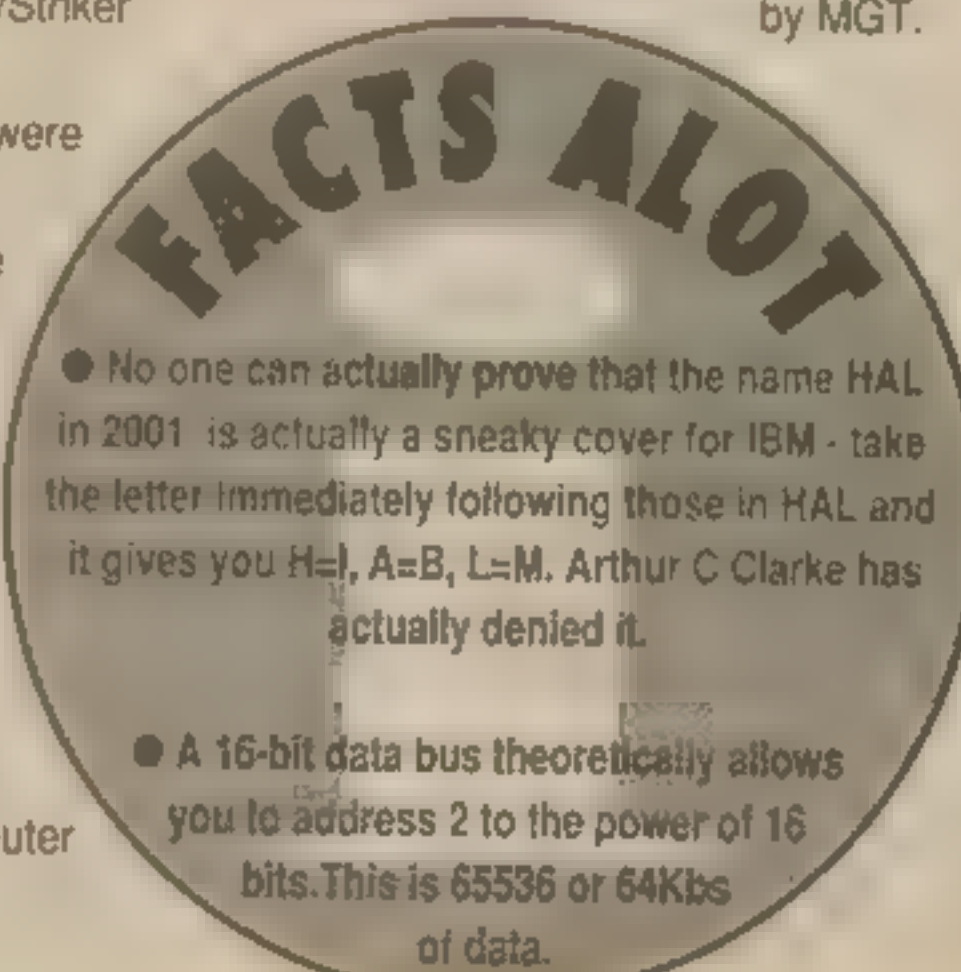
● Chris Waddle did not miss the penalty - the ball was deflected by a force shield controlled by a C64!

● West German computer research began in 1966

From our CyberSport writer All Ram-C

I telephoned a representative of the German league who commented: "What the hell are you talking about to me you greasy hack? I but a poor fishmonger from Munich am - get out of my face!"

The Football Association declined to comment although it is well known throughout sporting circles that the FA is contemplating bringing Peter Shilton back as a robot - Brian Robson already has parts supplied by MGT.



● No one can actually prove that the name HAL in 2001 is actually a sneaky cover for IBM - take the letter immediately following those in HAL and it gives you H=L, A=B, L=M. Arthur C Clarke has actually denied it.

● A 16-bit data bus theoretically allows you to address 2 to the power of 16 bits. This is 65536 or 64Kbs of data.

TECH TIPS



TIP! Arch modulator

Regarding the recent enquiry for TV modulators for the Archimedes, I have found two low cost modulators which could be tried. One from Wild Vision costs £149. The company's are: Wild Vision, 15 Witney Way, Boldon Business Park, Boldon Colliery, Tyne and Wear, NE35 9PE. Tel 091519 1455. An alternative is available from Orion computers priced £65. Contact: Units 8e and 8f, Moss Side employment centre, Leyland, Preston, PR5 3QL. Tel: 0772 421984.

Don't forget that opening up your computer to fit any of these units will invalidate your guarantee.

Peter Hopkins, Peterborough

There's a letter to warm the cockles of a Tech Ed's heart and hopefully inspire the rest of my correspondents. It's short, to the point, contains all the necessary details, doesn't wobble and offers information without unnecessary comment. It even offers a warning about the consequences of its advice. Let that be an example to all of those who pontificate their way through a dozen paragraphs before they get to the meat of the matter. Keep them coming like the one above.

HELP! Tuner

Is it possible to buy the tuner which converts the CPC monitor into a TV and if so, where? If I attached my monitor would I still be able to use it with my ST?

Anthony Bowles, Tyne and Wear

There were one time at least three TV modulators for the Amstrad CPC, but they seem to have gone out of fashion. The last one that I remember reading about was one produced by Amstrad itself. If you keep a wary eye on the reader ads in *Express*, you might find one at a bargain price. Alternatively, you could ring Amstrad on 0277 228888 or WACCI, the Amstrad CPC user club on 081-898-1090.

PHOOEY! DTP/PCW

With reference to the letter "HELP! Two fingers up" which appeared in *Express* 115, I was amazed in reading your reply to discover your apparent total lack of knowledge on the subject of PCW DTP. You said "DTP isn't one of the many adventurous things you can do on the PCW." PHOOEY!

You informed Mr Kruszynski that the

results of PCW DTP would disappoint him. BLAARGH! As you can guess from this letter head, I am about to instruct you to inform Mr Kruszynski that he will obtain perfectly acceptable DTP results if he buys *Microdesign 2*.

It's available for around £40 or so and is simply the best software for the PCW to be seen in a long time. Perhaps you'd like to give Mr Kruszynski my phone number so that I can tell him about it myself. Sorry I kept on typing Mr Kruszynski's name in full but it's good for typing practice

Phil Cole, Rotherham, S. Yorkshire

Oh dear! I'd have given a bit more credence to your letter if you'd included an example of DTP turned out on your trusty PCW. So that we don't get into an elongated debate in these pages, I'll tell you what I think DTP is.

In my opinion, true DTP is the combination of hardware, software and production that goes to produce *Express* and all of the other magazines here at Future Publishing. Look at the page that you're reading. Flick through the magazine. Could your PCW do all of this? If your about say: "Yes, but ..." stop. We obviously don't agree on the definition and will have to agree to differ.

To produce true DTP, your machine must first be capable of handling Post Script pages. These are files of page images that have been prepared in the Post Script page description language. This is the universal standard for DTP and although there are other page description languages, none seem to be available on the PCW. Nor for that matter do the scaleable fonts or other features so beloved of magazine, book and newspaper publishers.

Any attempt at DTP on the PCW will always be a compromise. The PCW is a fine text engine and three magazines here at Future prepare their text files on it but the idea of producing anything near professional output is fiction.

Having got that off my chest, I'll concur with you that the program that you mention is probably the best page designer for the PCW and is probably OK for low volume newsletters, info-sheets and as a cheap way of learning about design. To the PCW owner it probably represents the best value for money in versatility and copy output but don't try to start a national newspaper with it.

TIP! STE Modulator

Thanks for the advice before Christmas about my problems with the Amstrad Monitor and STE connection. In the end I didn't use the method you suggested but instead did the following.

A friend of mine suggested that I acquire a TV modulator MP3. This was on offer locally for a very reduced price.

The Atari now works happily with the Amstrad monitor in both low and medium resolutions and by using a mono emulator program it will also work in high resolution but the display quality is obviously affected. Thanks again for the interest shown and I hope that this information will be of use to you and any reader with the same problem.

K Goodinson, Nottingham

I'm glad to see that you found an alternative route to the solution. You put your finger on one of the problems of a modulated solution when you said that the display quality suffers. Still, it may be a solution that's ideal for some. Thanks.

HELP! Apricots again

I have been given a double sided 3.5-inch disk drive from an old Apricot machine (XEN I think?). I would like to use the drive to replace single sided drive on my ST, it fits physically and has the correct shugart 34-way connector. The problem is it does not have a separate power socket as most other drives do. I assume in the Apricot the power was accessed via the shugart connector. But which cables carries the 12v, 5v and 0v lines? I have found some info on the connections which are used by the standard ST drive so process of elimination leaves 02, 04, 06, 12, 14, and 34 to choose from. I am competent with a soldering iron so once I have the relevant info the drive can be connected up in a jiffy.

If you are not able to help perhaps you can pass my query on to the Apricot user group mentioned in Issue 105. I also have the remainder of the Apricot main box open to offers (30 meg miniscribe, mother board, graphics card, memory card, box & fan). Many thanks.

Philip Beed, Lee On The Solent, Hants

A long time ago in a galaxy far far away, I could have found out the information that you need in a moment by telephoning Apricot and talking to one of their helpful technical staff. Unfortunately,

technology seems to have arrived on the outskirts of Birmingham and Apricot has an amazing system where the switch-board operator listens to your query then transfers you to the appropriate answering machine. Thus instead of a quick answer, I must await the return call from Apricot's techie bloke. Still, at least that means that they pay the cost of the telephone call.

So that you can short circuit this saga that has the potential for consuming time, here's the number you need to get through to Apricot. Dial 021 456 4040 and the nice lady will put you through to the appropriate tape recorder.

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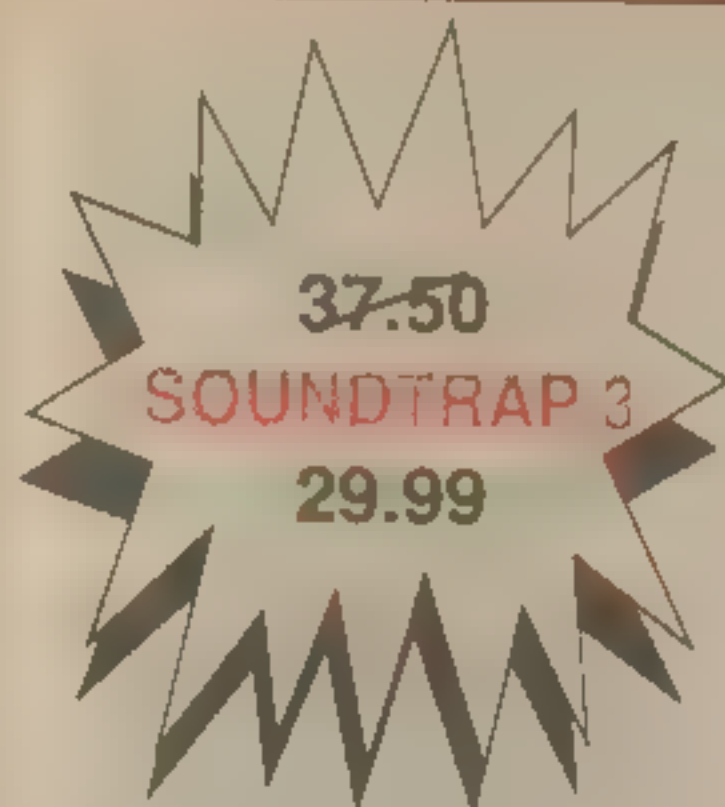
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Geoffrey H Clarke, Licensing Controller, British Telecom.

Whoops. I contacted Mr Clarke at Telecom and we had a long talk about the STD problem. It seems that Telecom is trying to make sure that the quality of these STD things matches its own and as such is striving to give the consumer a good deal and protect those companies that have been granted a licence and are fulfilling BT's criteria.

I sent Reggie and the boys round to explain the situation. David Batty at Sector Software and he's in full agreement and promises that a licence is on the way.

The licence costs around £100 and can be obtained from The Intellectual Property Unit, Telecom, 13th floor, 151 Gower Street London WC1 6BA.



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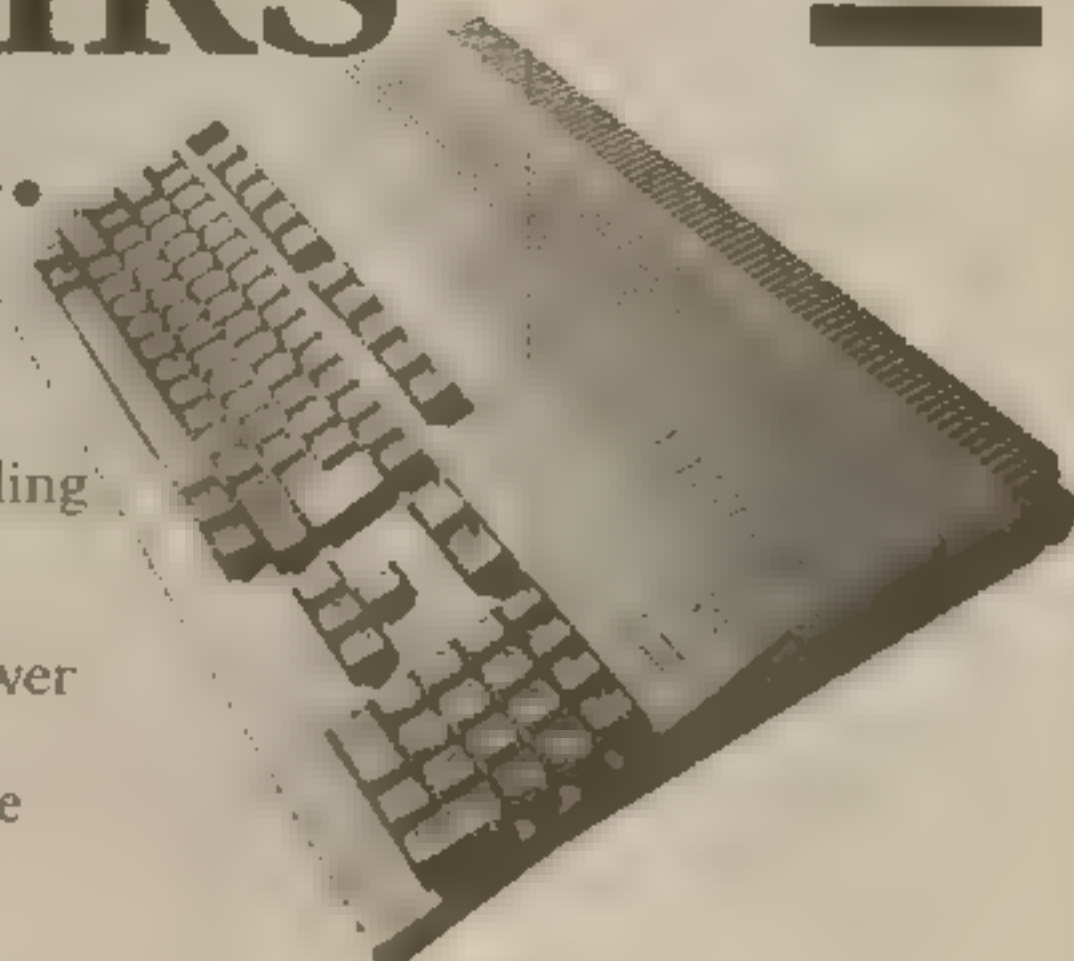


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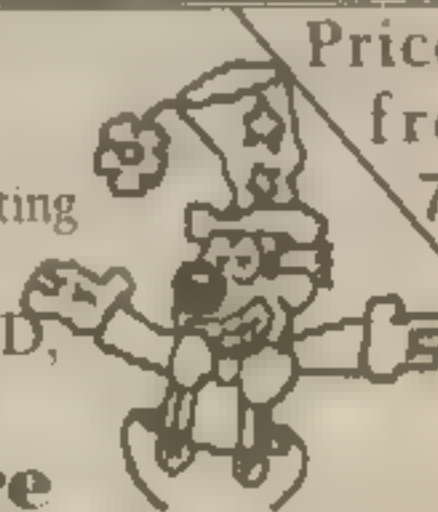
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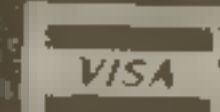
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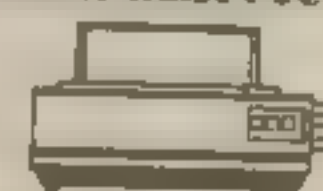
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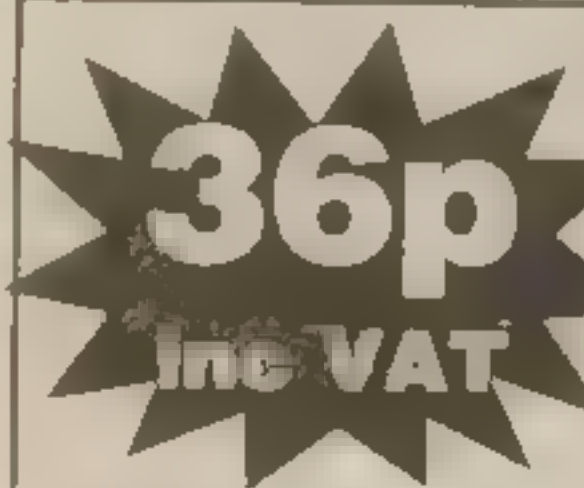
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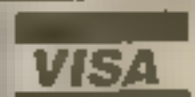
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Balloons from Apple, better English from Canada and some lavish profits from Commodore. Steve Gold reports.

BALLOON SPEAK

Even though the new range of budget Apple Macs is barely four months old, Apple is readying a swathe of new goodies for launching over the next few months. Among the many goodies is the first release of the long-awaited System 7.0 operating system software plus new ranges of high-end and budget priced laser printers.

Version 1.0 of System 7.0 will begin shipping in early May, say US on-line sources. To make life easier for new users of System 7.0 — especially users of System 6.0 — Apple has included a feature known as a Balloon Helper. As the name implies, this is a set of help balloons that can be popped up to tell the Mac users what differences there are with the System 7.0 commands compared to earlier versions of the Mac's driver software.

Balloon Helper will ship as a separate product shortly after it ships with System 7.0. The package works with System 6.0 Mac driver software and is said to be an ideal way to introduce the vagaries of the Mac system software to novice users.

On the laser printer front, Apple will launch — and ship — a new high-end range of Laserwriter printers this coming June. The new machines are expected to be priced at around the same levels as the existing LaserWriters, but feature a slick 68030 microprocessor.

Two Postscript units will initially be available. One of the printers will feature onboard Ethernet and support a very high-quality grey scale output. Both units will include an Adobe Postscript Interpreter and will be based around a Canon SX laser engine capable of eight pages per minute at 300 dots per inch (DPI) resolution.

One machine is based around a 20MHz 68030 microprocessor with a US price tag of \$4,500 — the same price as the 12MHz 68000 microprocessor-based LaserWriter IINT. It is designed to replace.

The second new model in the LaserWriter series will be based around a 25MHz 68030 microprocessor and sell for the same \$5,999 price tag as the 16MHz 68020-based LaserWriter IINTX. It replaces. Thanks to the inclusion of onboard Ethernet — using the new Mac Ethernet port system — the new flagship laser printer can be easily integrated into a Mac network.

ORIGINAL SOFTWARE

Everyone comes up with one or two software patches for their computer, but few turn them into real programs. Even fewer get around to turning their programs into shippable products and, even then, the price usually mounts up as the middlemen take their profits. It comes as a pleasant surprise, then, to see Bert Maggetta a long-established ST programmer with programs published in several US computer magazines, get around to creating his own software and selling it successfully by mail order at bargain prices. Bert calls his products, for the Atari ST, 'Original Software' and that's what it is.

The latest packages to appear are Cartoon Artwork and a games disk. Both cost \$5.00 each. *Cartoon Artwork* contains more than four dozen graphics cartoon images, along with a public domain file viewer, while the games disk contains several machine-code arcade games such as *Mummy*, *Phone*, *Zeek* and several others.

Other packages penned by Bert include: *Shakespeare's Sonnets* — a

database of the Bard's 154 sonnets with dictionary and search/find routines; and *Magazine Collector* — a database package for collectors of comics and other magazines. Both these packages cost \$10 each. Bert charges for his programs in the US, so adding \$2 to these prices should allow for international mail.

His prices are for double-sided disks, so if your ST uses single-sided ones, add \$2 per package for two single-sided disks instead of one double-sided one. Contact: Albert Baggetta, PO Box 759, Agawam, Massachusetts, MA 01001-0759, USA.

PICTURE FRIENDLY

Expos is the name of a new desk-accessory package that is being shipped from the States for just \$39.95. The package features a notepad and a graphics window, both of which are accessible from a desk accessory on the ST's WIMPS interface.

The GEM graphics window allows the ST user to load graphics files with a single keystroke, regardless of which program was used to create the files in the first place. Virtually all file formats are supported, including Macpaint, Neochrome and even Degas files. Low- and medium-res files are automatically loaded as high-res images.

Contact: Maxwell Computer Products Unlimited, PO Box 576, Louisville, Colorado CO 80027-9998, United States. Tel: 0101-303-666-7754.

ABUSIVE LANGUAGE

While PC users have a variety of spelling, grammar and syntax checkers to choose from, the Atari ST is lacking in the area. Not any more, though — Phil Comeau has released *Gramslam*, a \$34.95 package that checks for more than 1,200 abuses of the English language. Since the package originates from Canada it really does check for English problems rather than American syntax errors.

Gramslam 3.0 can output to a screen, printer or a disk file and retain the original input file for reference. There is only a slight drawback and that is the package only works properly with an ASCII file, and doesn't like 8-bit word processor files. Still, for \$34.95 plus \$3 shipping, that's a problem that users can live with. Contact: Phil Comeau Software, 43 Rueter Street, Napean, Ontario, Canada K2J 3Z9.

WIRELESS NETWORKS

Both Apple and IBM are reported to be working on wireless networks technology. Apple's announcement — made by company president John Sculley — revealed that Apple had made a formal petition for the allocation of a specific band width between 1,850 and 1,990MHz for use by the radio networking system, which Apple calls the Data Personal Communications Systems, or DPCS for short.

DPCS will, says Apple, use 40MHz slices of the frequency spectrum to allow

data to be rapidly exchanged between mobile network nodes and fixed nodes. In place of a hard-wired network, the radio link allows data to be exchanged at speeds of up to 10 megabits a second — the same speed that current Ethernet networks use.

Apple isn't the first computer manufacturer to look at using radio waves to interconnect local area networks — Motorola and NCR have already announced their systems. Of the two non-standard systems, NCR's Wavelan is the first to be marketed, although it has hit problems outside of the US.

In the UK and Europe, for example, the regulatory authorities are taking a dim view of the fact that NCR plans to allow computer users to transmit data, albeit on low power, over the radio spectrum.

Such activities have previously been carefully controlled and even then, available only to a small percentage of the population. IBM, meanwhile, is approaching the technology from a different direction.

Blue's technical staff are working to include the wireless LAN technology in a next-generation notebook PC. The machine(s) will — say online sources — be able to dispense with floppy and hard disks, since they will be able to transfer programs and data over the wireless network link.

As with all things new from IBM, details from official sources are sparse. With Apple showing its hand, however, even IBM might be persuaded to make an announcement.

GO FOR GOULD

Commodore International reports its net profits have tripled on sales of \$384.1 million for the second quarter ended December 31 1990, compared with sales of \$310.1 million in the same quarter the previous year. While sales increased by 24 per cent, net profits zoomed to \$36.5 million in the quarter ending December 31 1990 — up from \$11.3 million the same quarter the previous year.

According to Irving Gould, Commodore's chairman, the December quarter was the second largest sales quarter in Commodore's history with most of the sales coming from the company's European operation. The European operations accounted for a massive 85 per cent of the total sales for the quarter, with some European countries experiencing sales growth of more than 100 per cent.

The sales surge in the second quarter was mostly due to the Amiga, which achieved a unit growth of over 50 per cent, as well as a strong PC product line — exemplified by the C286-LT notebook and the slim-line 386SX-based machines.

However, it is not rosy for Commodore International. Unlike its European counterparts the US division reported 1990 annual earnings of just \$1.5 million — which was down 97 per cent on the previous year.

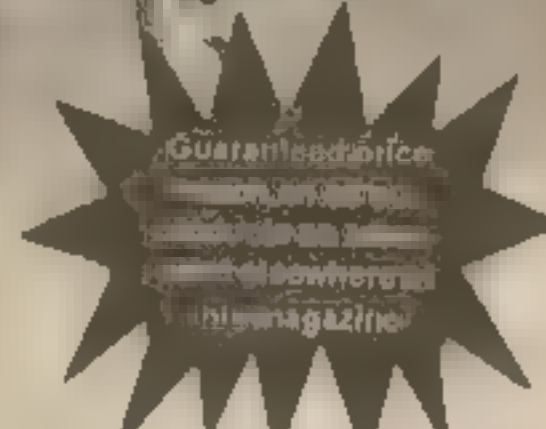
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8512.....	2741FN	3.15	2.99	LQ2550.....	2877DN	4.35	3.90
LQ3500.....	2741FN	3.80	3.55	NEC P2200(+).2844FN.....	4.10	3.85	
OMP2000/3000.....	2482FN	2.80	2.55	P1, P2, P6.....	2254FN	4.25	4.00
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CIRCUIT CITY

Skill with wire strippers and a soldering iron needs backing up with good solid theory. Keith Pomfret looks at a manual that offers over 800 pages of essential information.

The Electronics Repair manual weighed in on the post room scales at slightly over 3.5 kilograms. This weighty tome consists of a ring binder some five inches thick containing absolutely everything a wirehead ever wanted to know about anything. It isn't an impulse buy at a lofty £44.95, but after careful consideration, it's worth every penny. I was compiling a list of the books that would help to form the basis of a wirehead's library and when this one arrived, it simplified the matter. When you are considering the printed matter ■ supplement, augment and instruct you through your hobby, there are more related subjects than you'd initially think.

The first couple of sections are taken up by an exhaustive list of contents and a comprehensive index. Section three opens with a welcome page that lays out the aims and objectives of the manual. While the welcome is provided to introduce the new user to the advantages and benefits of the book, it doesn't shirk its moral duty. A paragraph aimed squarely at the newcomer to electronics lays out information about the complexity and delicacy of some electronic equipment. It goes on to explain that maladjustment and misconnection can cost in terms of damage and hard cash.

SAFETY FIRST

You can't work with electricity for long without meeting it in its less friendly 'mains' form. The line voltage in the UK ■ 240v at 50 cycles. This is more than enough to kill you and a few of your mates, so it's good to see a complete section on safety before there's even a hint of going near anything live.

The safety section highlights hazards and potential dangers and there's even a handy checklist of components and instances when the risk of electric shock and early demise are grave.

A further check list addresses what you can do and check in order to offer yourself the best protection. Checks on test equipment, soldering kit, lighting and even the storage of hazardous materials is covered. After all, it isn't just an electric shock that can kill. An

aerosol spray left in sunlight can explode and ■ or maim you. Advice on the kind of fire extinguisher to have handy is given and layout and access are covered too.

FIRST AID

In the event of someone suffering a severe electric shock, there is a no nonsense plan to aid their recovery. It gives the most important advice that is so often missed – isolate the power supply before you attempt to tender first aid. In many cases, someone has rushed to give first aid to a person who has been electrocuted only to suffer the same fate themselves because the power supply is on. Hints on protecting yourself while removing the power supply are given.

Once the power is off, first aid can be given. The manual goes through checks on breathing, artificial respiration and how to deal with the situation when someone's heart has stopped.

FUNDAMENTALS

One of the best things about this manual, is the way it doesn't assume the reader knows everything already. The more advanced may scoff at some of the simpler definitions and tables but there's always a time when even the most experienced reader will forget something and it's nice to be able to refer back to it. So scoff not. Your time will come.

The computer and electronics world is overburdened with TLAs and MLAs. These stand for Three Letter Abbreviations and More Letter Abbreviations. We may find it easy to remember that ADC is an analogue digital converter and ASCII is the American Standard Code for Information Interchange, but how often do we use AWG, CGLI or CCITT. No, I'm not saying what they are but Chapter 3 section 3.1/3 will!

Read any in depth article or manual and you'll find abbreviations like mega, tera, nano, and pico. As well as explaining what all of these are and their relevant symbols, there are realistic examples given to help you

see the implementation ■ these multipliers and sub-multipliers. This method of information followed by example is closely followed throughout the section on basic principles.

Ohms Law, power and energy, electrical supply and waveforms are all covered. The differences between alternating and direct current and capacities and charge rates of accumulators are available on the page in tabulated form.

After this brief introduction ■ the rudiments of the subject, the manual looks at individual components, how to identify them, what they do and their place in the circuit. More importantly, it divides them into the two main categories and explains the difference. Components such as resistors, capacitors, inductors and transformers occupy the Passive section while diodes, transistors, integrated circuits, thyristors, triacs, LEDs, regulators, amplifiers, timers, logic, processors and integrated circuits are closely examined in the Active section.

The section on basics ends with advice on substitution of components and more importantly, a list of component suppliers with telephone numbers and addresses. There are fifteen suppliers on the list including our old standfast, Maplin.

GETTING TOOLED UP

With the knowledge of what the components are, what they do and where to get them from, the next logical step has to be the tools and their uses. *The Electronics Repair Manual* is the first complete work that I've come across that takes things in their logical progression. It's a luxury to work through a volume of this size in one direction without having to constantly flit back and forth like a demented dragonfly.

Basic tools are covered with illustrations to show generically what they look like. Cutters pliers and strippers are covered in depth as the essential wire manipulation tools. Soldering and importantly de-soldering are described with the tools and the method looked at. Essential screwdrivers, wrenches and tools for inspection and crimping benefit from a detailed description of their use with hints on how to get the best from them. Finally, there's a look at the more specialised tools in use with printed circuit boards (PCBs).

As well as tools, the electronic hobbyist will find it necessary to use diagnostic and test instruments. However simple the project, there will always be a necessity to check and test various parts of a circuit for its integrity. If you're working on existing circuits and are modifying or repairing them, you'll most certainly need test instruments.

The essential basic test instruments for a well specified bench are a multimeter, regulated power supply, signal generator and some diagnostic digital instruments. An oscilloscope is a useful addition and while many would consider it a necessity, it can be an expensive acquisition with its cost running into several hundred pounds. Again a checklist scenario can help you to choose the right instrument. When choosing say a multimeter, the manual offers you a list of necessary features and ranges. The choice of analogue or digital

Type USA	Equivalents Europe	Type USA	Equivalents Europe
2N392	AD 130; AD 149	2N5059	BF 257; BF 258
2N526	AC 121; AC 152	2N5190	BD 175; BD 433; BD 435; BD 437
2N677	AD 133	2N5191	BD 177; BD 439
2N1359	AD 130; AD 149	2N5192	BD 179; BD 441
2N1540	AD 149	2N5193	BD 176; BD 434; BD 438
2N1905	AL 103	2N5194	BD 178; BD 440
2N2222	BC 223	2N5195	BD 442
2N2293	AL 103	2N5310	BC 167; BD 168
2N2431	AC 153	2N5324	AL 103
2N3054	BD 163	2N5367	BC 258
2N3107	BC 141	2N5655	BF 457; BF 458; BF 459
2N3109	BC 140	2N5879	AD 162
2N3742	BF 257; BF 258; BF 259	2N5888	AD 162
2N3964	BC 415	2N5893	AD 162
2N3965	BC 416	2N5962	BC 549
2N4032	BC 161	2N5999	BC 259
2N4232	BD 163	2N6012	BC 338
2N4921	BD 165	2N6015	BC 337
2N4932	BD 169	2N6261	BD 163
2N5058	BF 259	2N6426	BC 517

• Equivalence table of the principal transistors in USA and Europe

is covered with the cases for and against both. With the multimeters and all of the other test equipment, the function and use is explained.

The final section on tools and their uses offers an in depth checklist with suggested specifications for the tools that you may need. This is useful in that it gives dimensions and specifications as well as a brief description of each tool's use. For example, this one of the tools on the checklist.

Oblique cutters. Supreme series - full flush

Use	- designed for printed circuit board component lead cropping only
Specification	- blade length - 8mm
Total Length	- 109mm
Blade angle	- 75 degrees
Cutting capacity	- 1mm copper wire
Construction	- box joint with insulated handles
Manufacturer	- Linstrom

As you can see, the way that the tools are described means that if you can't get the particular one on the list, you can choose an alternative but stay close to the specification. In total there are over 12 A4 sized pages including checklists for tools and instruments. To complete the ergonomic workspace, there's a plan for a usable workbench.

SOLDERING ON

The area of repair and construction that seems to cause the most problems is soldering. There's a knack to getting the iron at the right temperature to allow the multicore solder to flow freely on to make the perfect joint. The knack can only come with practice and we've

all melted components and burned fingers at one time or another. What it's very difficult to find out, though, is the rudimentary knowledge of how to solder and the theory behind it.

The section on how to solder takes you through the type of solder that's best for the job, and gives instruction on basic soldering iron maintenance before walking you through solder practice. Further instruction offers the definitive way to solder correctly and provides simple illustrations. We're all going to get it wrong occasionally and there's a remedy for that too. Three pages on desoldering techniques and how to recognise a soldered joint that needs desoldering and reforming conclude this section. An indepth description of all the diagnostic equipment occupies the remainder of the section on test equipment and tools.

FINDING FAULT

The final tutorial section of the book is devoted to fault finding techniques. This is further broken down into three discrete sections: Common faults and first steps. Equipment for fault finding and Fault finding charts. Again the stepped format comes into its own with the initial section covering the common faults that you are likely to find in repair and construction. You are led gently through the tools and equipment that you are likely to need and finally there are charts to help you.

Once you've worked your way this far into the book, you'll be ready to fire up your iron and get to work. If you are branching off on your own with a Circuit City project or a circuit of your own, you'll still want the manual open as a reference source. If you're delving a bit deeper and planning maintenance or repair work on

READ ON

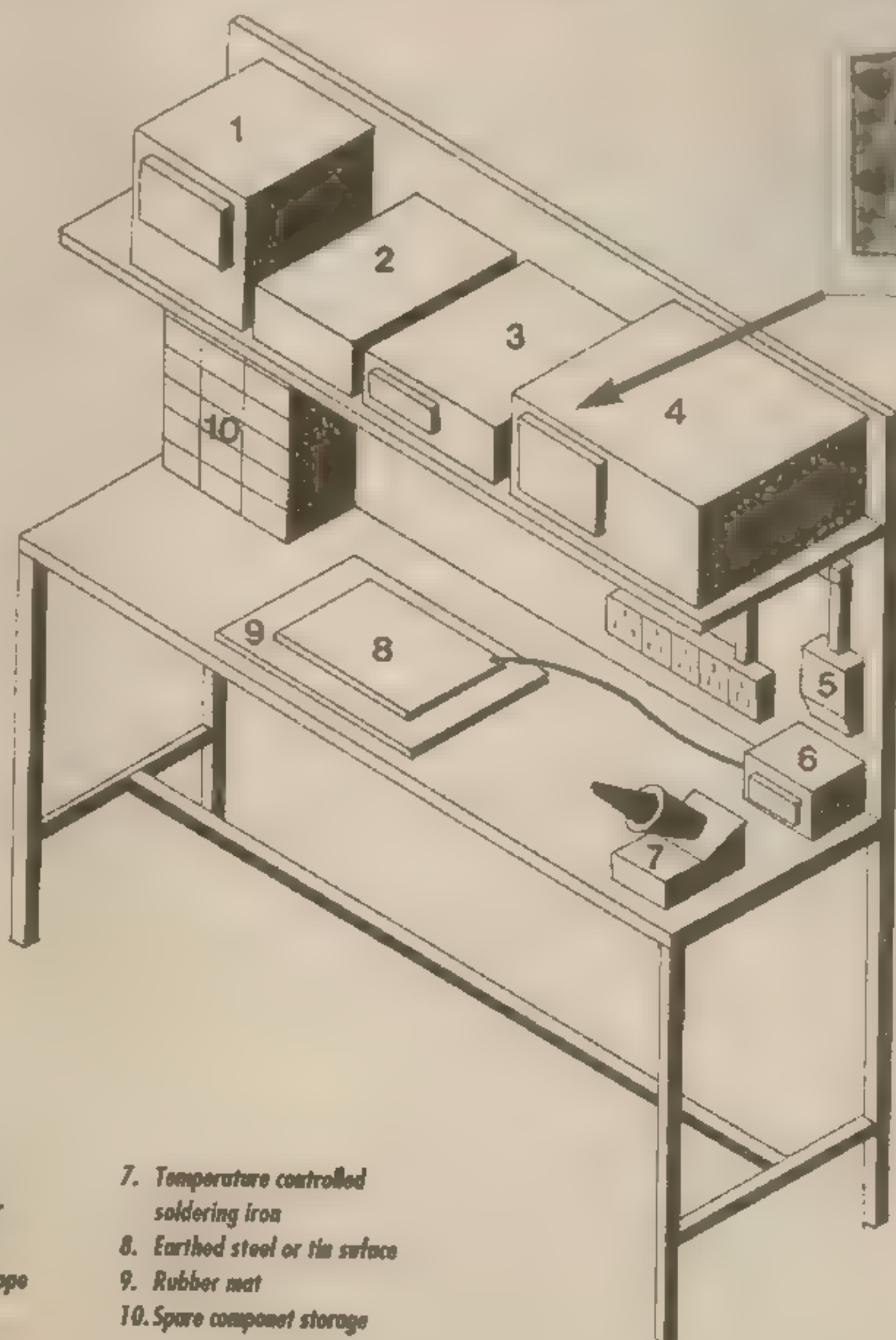
Other books to help you out can be found in a public library. For someone who wants to use public library resources rather than invest in books of their own, the following books are an ideal start: *Understanding Digital Electronics* by RH Warring. (ISBN 0-8306-0593-2); *Electronics in practice* by MP Horsey. (ISBN 0-631-90061-6); *Basic Electronics* by Malcolm Plant. (ISBN 0-340-41490-1) and *Teach Yourself Electronics* by WP Jolly (ISBN 0-340-32976-9).

your computer, or for that matter any other piece of consumer electronics, the chances are that there's a dedicated section in the second half of the manual. There's an extensive section on home computers at the back but your knowledge doesn't have to stop there. There are complete sections on Camcorders, video recorders, television, compact disc players, tape recorders and players, radio receivers and amplifiers.

AND FINALLY ...

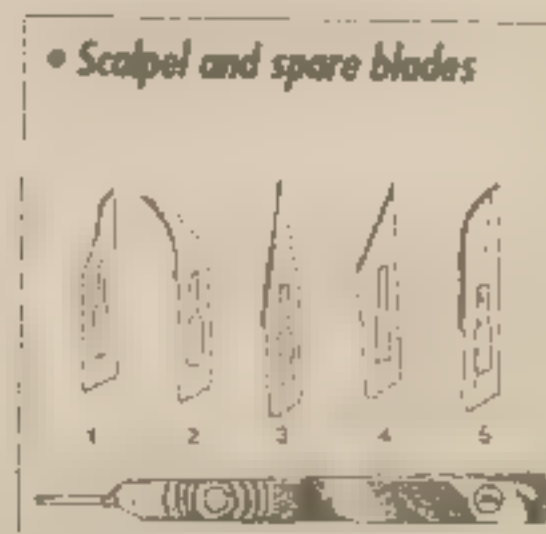
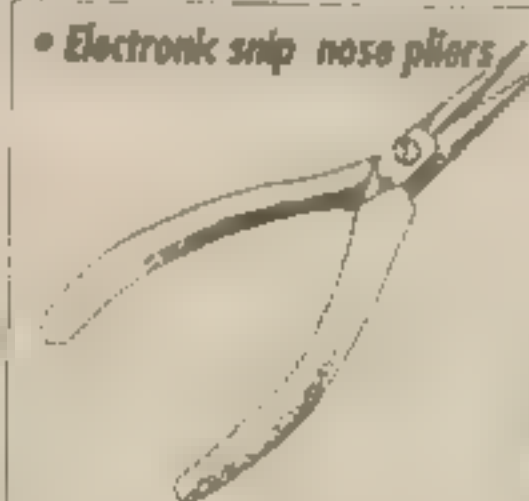
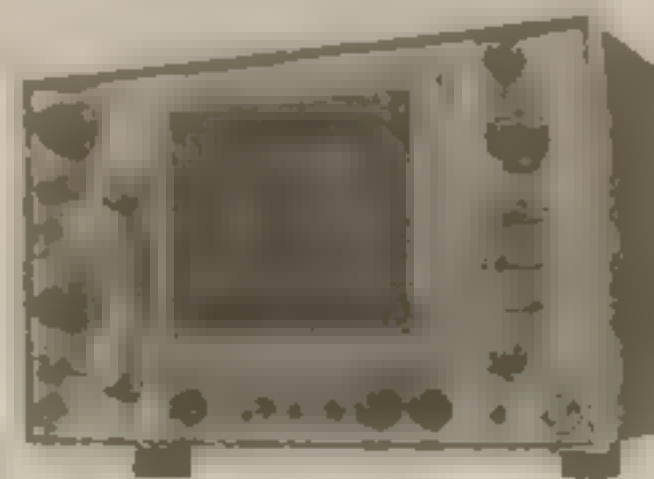
The Electronics Repair Manual is a complete reference in itself. On its own it would be worth the £44.95 asking price. The supplements that are already available (one came with the review copy) and those planned make it an absolute necessity on the Circuit City bookshelves and a desirable present for anyone with an approaching birthday. ■

The *Electronics Repair Manual* is published by WEKA Publishing Limited, the Forum, 74-80 Camden Street, London NW1 0EG. ISBN 1-85303-010-4.



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TRAINING FOR YOUR FUTURE

THE LOGIC OF LISTS

Lists are simple to create and use – Mary Branscombe shows you how to use these essential tools effectively.

Lists are very convenient data structures for handling any sort of data that does not have any definite structure of its own. Although it is more efficient to access data stored in structures such as arrays, you must have some way of associating the necessary subscripts used to store and access the data, with the data to be stored.

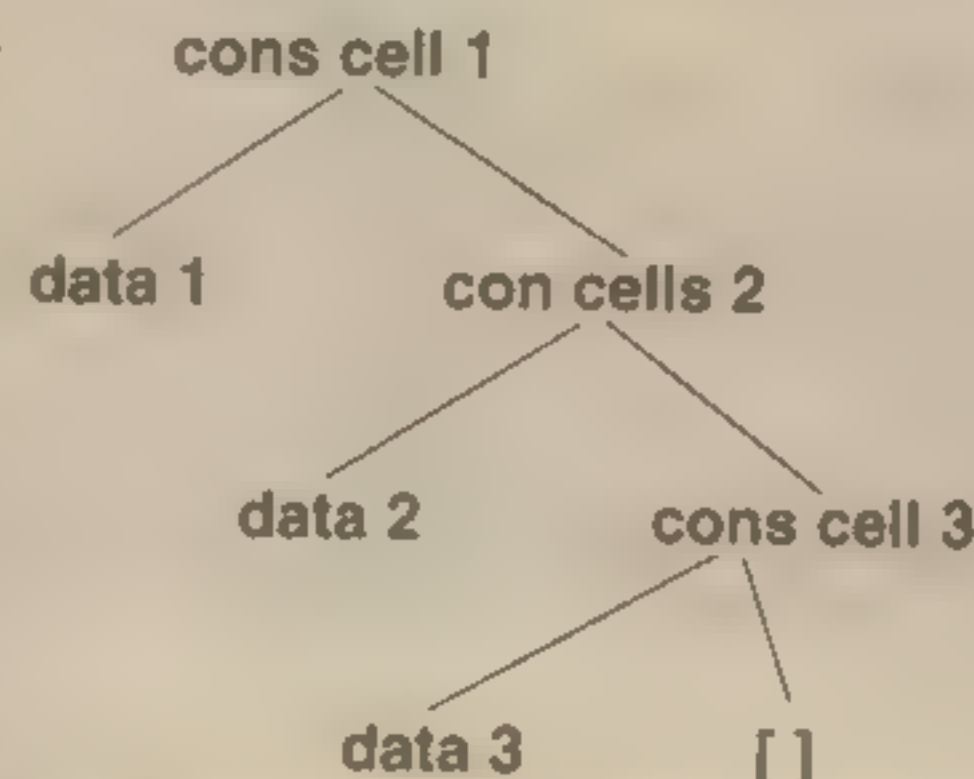
Lists are also simple to create and use, making them ideal for prototyping applications, when you don't know exactly what data structures you will need to hold your data; the lists can be replaced by more suitable data structures when necessary. A list is simply a collection of linked data objects, each of which has the same structure. Each element or 'cons' cell, consists of the car, a pointer to the data itself and the cdr, a pointer to the next element, as in the diagram. The last element in any list is the empty or null list, written [].

The first item in a list is known as the head of the list and all the other items are termed the tail. The most convenient notation for lists is that used in Prolog, where [Head|Tail] represents a list with head Head and tail Tail. In a list consisting of the digits from one to nine, the head of the list would be one and the list could be written [1|2,3,4,5,6,7,8,9]. Lists are broken down by repeatedly removing the head of the list from the tail, which is then treated as another list, from which the head can again be removed, and so on. Removing the head from this list produces [2,3,4,5,6,7,8,9], which is again a list, this time with the head two.

Similarly, adding an element to a list produces a new list, to which further elements can be added. As the diagram shows, the structure of lists is defined recursively; either a list consists of a list element and a smaller list, or it is the empty list. This means that recursion is the obvious method to use for manipulating lists.

There are many functions that are used for manipulating lists, and languages that support list processing will often provide a number of these as basic operations in the language. If these are not provided then, as long as you understand the recursive structure of lists, it is a straightforward matter to write the functions. All languages that support list processing provide a way to access the head and tail of a list. In Lisp, you call the car and cdr of the list, in C the head pointer points to the listhead node, which points to next. In Prolog, you pass

THE STRUCTURE OF A LIST



the list into a structure as [Head|Tail], which splits the list.

To add an element to the beginning of a list, you create a new list with the element as the head and the existing list as the tail. To delete the first element of a list, you simply split the head and tail of the list and retain the tail. Other operations, such as adding an element to a particular position in a list or deleting a particular element from a list, finding the length of a list, reversing a list, merging two lists or checking whether an object is a member of a given list, require recursive techniques.

In each case, one method is used when the relevant element, or the end of the list, is reached – the base case or termination condition – and another method is used to remove the head from the list and perform any necessary calculations. For example, the member function, which checks whether a value (Value) is a member of a given list, is written in two parts. The first simply strips the head from the list and compares this with the value in question. If the two values are the same, the function succeeds. If not, the second method strips the head (Head) from the list and calls another instance of the function with the tail (Tail) in place of the original list. In Prolog, this can be defined as:

- Lists are a simple-to-use data structures that can be replaced later if necessary.
- Lists are built up recursively, so that recursive functions can be used to deal with them.
- The data in a list is accessed one item at a time, from the front of the list.

A CONS CELL

CAR	CDR
data 1	

CAR	CDR
data 2	

CAR	CDR
data 3	[]

```

member(Value, [Value|Tail]).
member(Value, [_|Tail]):-
    member(Value, Tail).
  
```

The variables Value, Head and Tail hold the value in question, the head of the list and the tail of the list respectively. The symbol :- divides the name of the procedure, known as a clause in Prolog, from the body of code to be performed.

To calculate the length of a list, you can count how many items you need to remove from the list before it contains only one item, or remove items until there is only one left and then count how many items there are to put back.

To merge two lists together, the elements of the first list are added to the front of the second list, one element at a time. If you add the empty list to an existing list, the result is the same list; this tells us when we have copied all the elements from the first list into the second and copies the combined list into List, which returns the result – the two lists merged into one.

```
merge([], List, List).
```

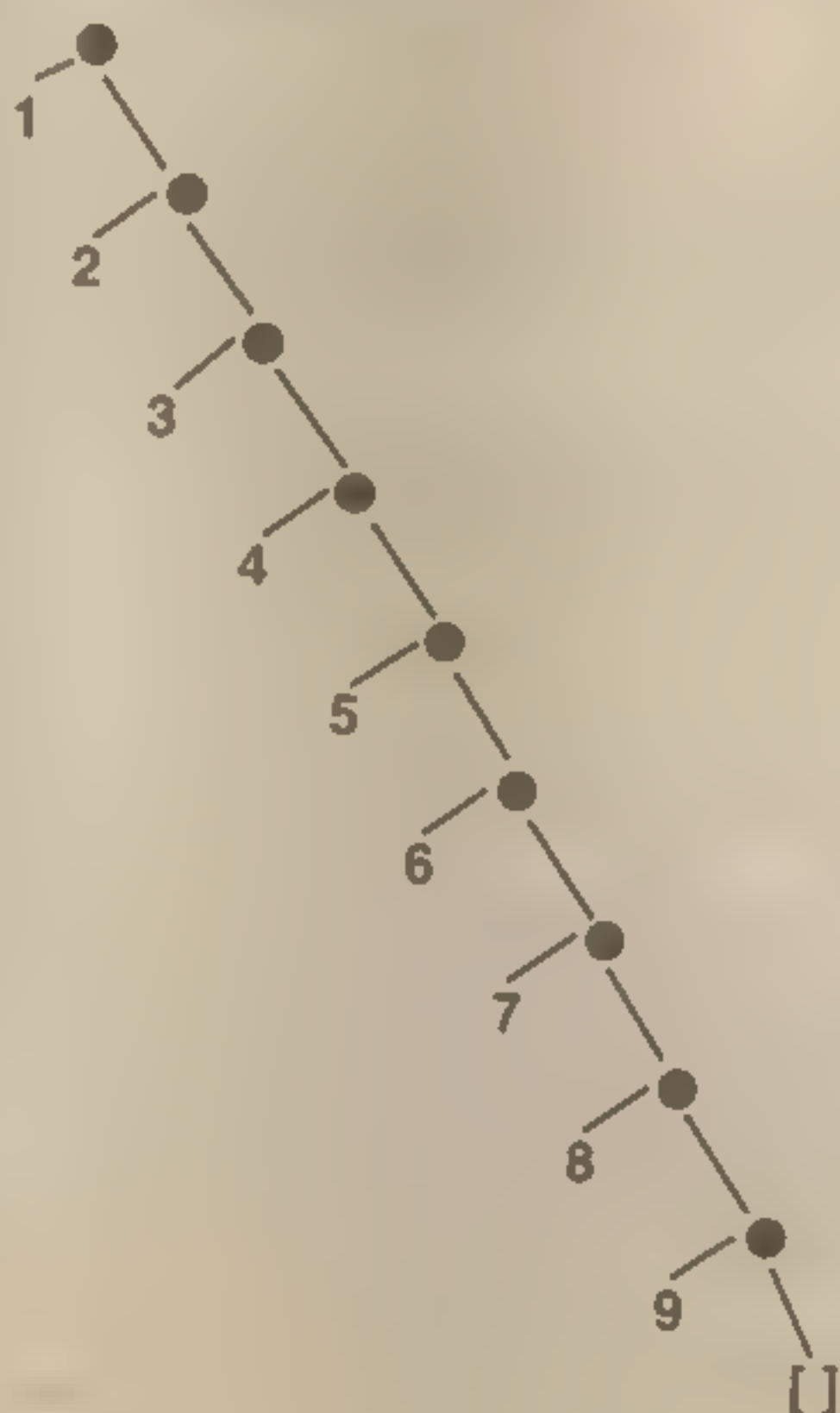
In all other cases, we take the first element, Element, of the first list, List1, and add it to the front of the list we are building up, List3, and repeat for the rest of the list.

```

merge([Element|List1], List2,
      [Element|List3]):-
    merge(List1, List2, List3).
  
```

Other techniques for manipulating the contents of a list are coded in the same way – the contents of the list are accessed one by one, from the front and the base case tells the procedure when the list has been unwound sufficiently. ■

[1,2,3,4,5,6,7,8,9] AS A LIST



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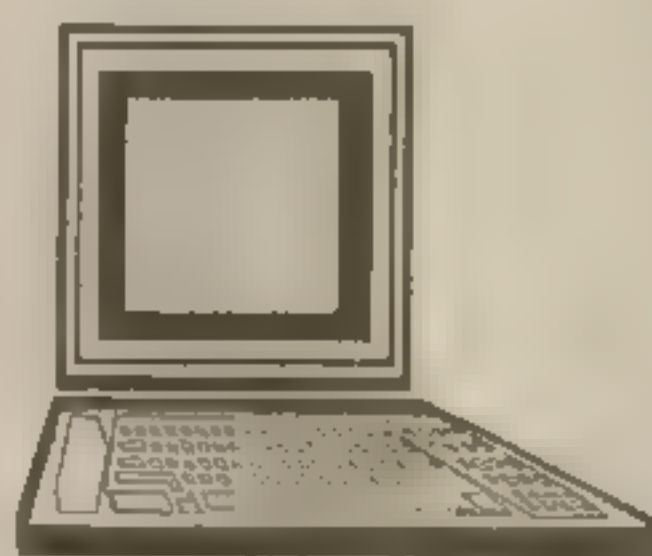
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There are various programs incorporated in this charity compilation, and are generally of a good quality. There's a

THE PD COLUMN

Well, long after the success of Band Aid, Live Aid and Sport Aid, here comes PD Aid, our man Adam Waring checks out a piece of charity software.

number of games included, as well as a selection of more serious utilities. Let's see what ■ on offer...

Tanks is a simple idea, and one that's been around for quite a while. However, it's brilliant fun and incredibly addictive. Once you and a friend start playing, you'll find it's very hard to stop,

the plot is as follows...two tanks face each other across the battlefield. The objective is simple: destroy him before he destroys you. Cunning, skill, and ■ degree of luck is needed to outwit your opponent as it's one on one.

Rubble, as well as fairly straight, and solid walls, litter the battleground. Strangely, your shells bounce off these, allowing you to hit your enemy from around the corner. Then again watch out, he can do the same to you...

It's a two-player game - there's no option to play against the computer. The players use joystick and keyboard to control their armoured vehicles. You can rotate your tank, and move in both forward and reverse directions, as well, of course, as firing explosive shells.

Your projectiles travel for a fair distance, rebounding off walls as they do so, before disappearing. Should the enemy tank be hit, or indeed your own tank be struck by their fire, then it explodes, and it's one point up ■ the

surviving player. It is also possible to shoot each other simultaneously.

The player who manages to log up a predetermined number of kills is victorious. You can set the number of kills that are required to win overall from one to nine.

There are a number of battle-grounds to wage war upon - in fact six in all. The only difference is the layout of the walls, but this, although a small change, provides a significant variation as you have to learn to adapt your strategy according to the way your artillery behaves as it ricochets off the various walls.

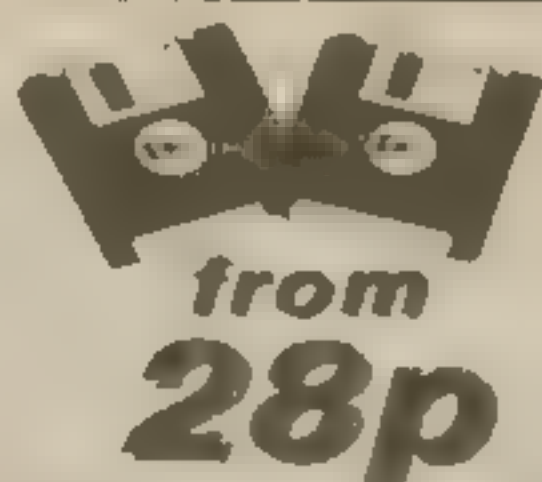
It's pretty enough, the backgrounds are a lovely muddy pattern, and the tiny tanks are sweet. Sound too is suitably war-like, with plenty of booms and bangs to keep you going.

Mr Dig has a craving for cherries. It's so strong an urge that he has to venture underground, and dig through the mud to find them. Unfortunately this



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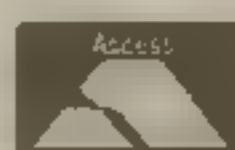
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underworld is inhabited with monsters who have a craving for Mr Dig. Luckily, though, he can drop gigantic apples on their heads to kill them...

Yes, alright, so the scenario's pretty unlikely. But *Mr Dig* is based on the cutie game that started them all. You, of course, play the part of the intrepid little hero. His life is in your hands, and only the deftest of joystick movements stand between certain death and getting through to the next level.

There are plenty of levels, but it'll take some time for you to see them all, because it's a tough task to gobble all those cherries before you're consumed by the monsters that roam around the underworld. As well as cherries there are diamonds for you to collect which earn you bonus points. These are not compulsory, but they go a long way to improving your overall score.

You shouldn't hang around for too long, though. Those monsters metamorphosise into real nasties after a minute or so. Whereas these creatures can normally only move through the tunnels that you have dug, the altered beasts can chomp their way through anything; mud, apples, cherries. Nothing stands in their path.

The graphics are small, but very, very cute. It almost seems a shame to kill them by dropping apples down on them. It's a very polished game, and well worthy of a place in your PD collection.

Reversi is an emulation of that age old classic board-game, Othello. Arcade-style reflexes are not what is required here. Instead, a great deal of logical thinking is a much more suitable attribute.

The game is played on an eight by eight square grid. The four central squares are occupied, with two black and two white counters. The idea of the game is to end up with the majority of the board being covered with pieces of your own colour.

The way you capture your opponent's pieces is by trapping them between two of your counters in horizontal, vertical or diagonal lines. Captured pieces become your colour. You take it in turns to place counters on the board. It's an extremely strategic game though, with certain areas of the board being more valuable to capture than others. Take control of the key positions, and you'll be able to dictate the way the game plays, winning large sections of the board when the end of the game draws near.

You can choose to either play against the computer, or another player, in fact the option screen allows a number of game configurations and difficulties to be set up.

The computer plays a good game - but not good enough, I hasten to add. Mind you, I did play it on the easy level, and I'm sure the higher levels are tough

enough to give even the greatest player a run for their money.

As well as the fun side, there are plenty of more serious applications on the disk. Here's a brief and selective list: 50/60 Hz is a screen synchronisation switcher that allows you to switch between the two rates; Baksplat is a utility that erases all those back-up files in one fell swoop; E Desk allows Atari STE owners to boot up in medium resolution - a bug in the STE's operating system prevents early users from doing this; Convert changes different types of files into ASCII - this is useful for swapping files between word processors; Playback is a sampler play back program. It allows you to play samples, either in your own programs, or as a stand alone utility; Ramload lets you load

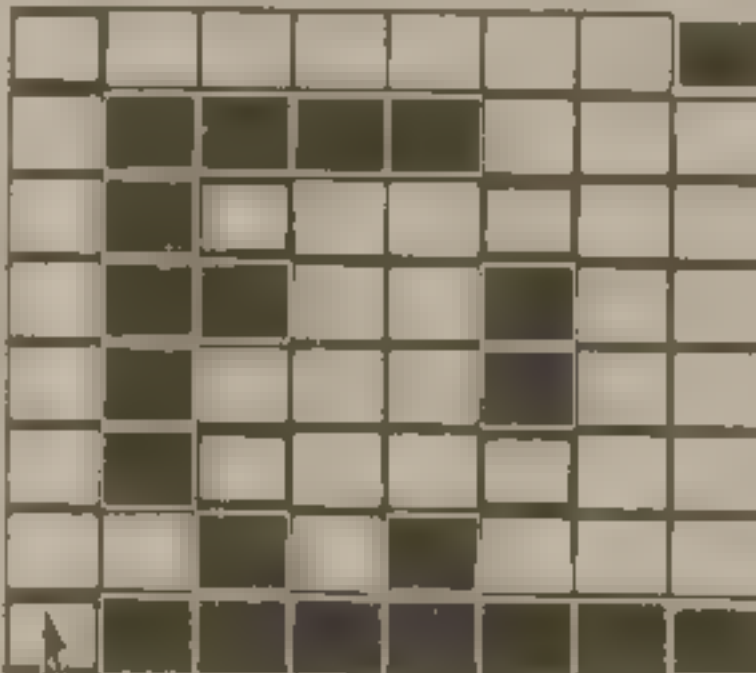
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your programs into a RAM disk for much faster access; Slideshow produces slide-shows to show off all those pretty pictures that you've managed to create with your art package. Phew - is that enough to be going along with?

So there you have it. A disk that is packed full of all sorts of programs, and it's well worth the money because it's all in a good cause. Buy it! ■

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The ABC is the latest addition to a comprehensive range of both 286 (8Mhz or 12Mhz) and 386 (16Mhz and 20Mhz) PC's, from the Business Systems Division of Atari Corp. Atari's PC range offers an unsurpassed combination of reliability, compatibility and expandability, with unique features like Atari's 44Mb removable hard disk on their PC4. Return the coupon NOW for further details of the complete range of PC products from Atari's Business Systems Division.

ABC TURBO

AVAILABLE: JUNE 90

To put the ABC even further ahead of the competition, we have introduced a special 'Turbo' version, which includes a super fast RLL hard disk controller to increase the data transfer rate from 150KBytes/s to 800KBytes/s, with a performance index of 4.801. Plus! to provide exceptional graphics with an outstanding colour resolution up to 1024x768, we have included a Super VGA graphics adaptor and a 14" VGA colour monitor (which also supports 1024x768 resolution), all for an additional price of only £300. Check the ABC Turbo against the competition, at only £1299 (+VAT) with 30Mb hard disk, Super VGA colour graphics capabilities, plus 12 months on-site maintenance, it offers unbeatable value.

LOW PRICE - HIGH SPEC!

CPU + MOTHERBOARD	<ul style="list-style-type: none"> 8Mhz 80286 16-bit CPU Landmark Speed = 10.3Mhz, Norton SI Test = 9.0 Latest NEAT (New Enhanced AT) technology chip set Has user selectable bus, DMA speeds & wait states Programmable to operate at 0 or 1 wait states 640K RAM base memory (expandable) Motherboard expandable to 4Mb RAM memory Real time clock with battery back-up Full 16-bit data line capability Socket for 80287-8 numeric Co-Processor 3 16-bit AT expansion slots (max)
DISK	<ul style="list-style-type: none"> 32Mb RLL hard disk - 150KBytes/s transfer - 60ms access Fast disk controller - 800KBytes/s transfer - Turbo version 1.44Mb built-in 3 1/2" floppy disk drive Space for two 5 1/4" and two 3 1/2" drives (max)
I/O	<ul style="list-style-type: none"> Parallel port built-in (25-pin Centronics) Serial port built-in (9-pin RS-232) Mouse controller port built-in (9-pin serial)
GRAPHICS	<ul style="list-style-type: none"> Super VGA video graphics controller - 512K - Turbo vers Super VGA: 256 colours in 800x600 res - Turbo vers EGA video graphics controller built-in EGA: 16 colours available from a palette of 64 EGA: 256K of dedicated Video RAM built-in MDA, CGA and Hercules graphics controller built-in
PHYSICAL	<ul style="list-style-type: none"> Low noise operation Ergonomic small footprint (38cm x 41cm x 15cm) Keyboard - 102 key enhanced AT (12 function keys) Keyboard - has 2 position height adjusters
PLUS!	<ul style="list-style-type: none"> Fully OS/2 compatible (requires 4Mb RAM) Supports Industry Standard Networks MS-DOS 3.3 with GW BASIC 3.22 12 Months FREE on-site maintenance included

286 AT

WITH 30Mb HARD DISK & EGA MONITOR - £899

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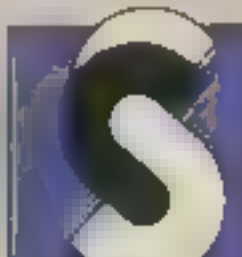
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Which computer(s), if any, do you own?

Things are already hotting up for the annual Easter rush, with software houses getting products released extra early, so Games Week's spies have had no trouble finding out what's in store...

Electronic Arts is busy preparing *Bard's Tale 3 - Thief of Fate* for the Amiga. Following on from its award-winning predecessors, *Thief of Fate* has more dungeon levels, more monsters and more magic. It's a multi-level, multi-character game which uses both your logic and strategy synapses (you do still have some, don't you?) in your quest to save the fabled city of Skara Brae from the Mad God Tajan. Out in March.

EA has also been converting older games to the Amiga, notably *PGA Tour Golf* and *Ski or Die*. *PGA Tour Golf* is apparently the business when it comes to golf games, featuring things like helicopter fly-bys, tips from professionals and superb instant replay options. *Ski or Die* is a different animal. Get your saloppes on, and go crazy in the snow! Try out the snowboard half-pipe, the downhill blitz and the snowball blast. Sports fans should be looking out for these two in March.

EA is saving its biggest fanfare for *Centurion*:



GAMES WEEK

Neil Jackson gives you the low-down on the latest new games, playing tips, cheats and news.

Defender of Rome, which it is claiming is the first cinematic adventure with gameplay. Designed by Kellyn Beck, (creator of *Defender of the Crown*), *Centurion* has you in the role of a young officer in charge of the Roman legions. You choose the tactics used to bring the provinces under your control, you fight the battles and order the troops, and if you're good enough, you get to direct the Roman fleets into battle. If you're lucky, too, you might even get a chance to bonk, or seduce, Cleopatra - the most beautiful woman in the world

(apart from Jamie Lee Curtis). Guess when to look for this on the Amiga - yup! March, again!

Meanwhile, Mirrorsoft has not been slacking either. It has just announced its plans to launch a new label called Mirror Image, which is primarily concerned with re-releasing 16-bit games from its (or anyone else's) back catalogue. The first batch of four oldies are *Defender of the Crown*, *Rocket Ranger*, *Speedball* and *Carrier Command*. If you missed any of these first time around, now's your chance to grab 'em.

And finally, strange rumblings from the Renegade house indicate the imminent release of *Gods*, the new Bitmap Brothers game. It features music by Nation 12, an all-star band, comprising such entertaining figures as John Foxx (he of Ultravox fame), Simon Rodgers (of the Fall and Ez-ee Possee), and DJ Streets Ahead. The track used in the game is called *Into the Wonderful* and will be released by Rhythm King (Renegade's record-label half) sometime this year.

As for the game, that's out in, would you believe it, March. ■



TOP 10 SIXTEEN-BIT GAMES	TIME	LAST	CHART	TITLE	PUBLISHER	MARKET
	1			Speedball	Mirrorsoft	ST AG
	2			Final Whistle		AG
	3			19 Stealth Fighter	Microprose	ST AG PC
	4			Chaos Strikes Back	Mirrorsoft	ST AG
	5			BAT	Ubisoft	ST AG
	6			Kick Off 2	Anco	ST AG PC
	7			Lotus Turbo Esprit Challenge	Gremlins Graphics	ST AG
	8			Powermonger	Electronic Arts	ST AG
	9			M1 Tank Platoon	Microprose	ST AG PC
	10			Steve Davis World Snooker	CDS	ST AG

For the week ending 26th January 1991
ST = Atari ST AG = Commodore Amiga PC = IBM PC or compatible OT = Other
Chart compiled by Gallup. © European Leisure Software Publishers Association.

INDIANA JONES AND THE LAST CRUSADE

AMIGA, ST and PC

Is Lucasfilm's version of Indy's Last Crusade turning into a bit of a lost crusade for you? Yeah? Then check this out - a full list of all the objects that you could ever wish to find, plus their uses.

ITEM LOCATION	ITEM	USE
Air Terminal	Zeppelin tickets	Get onto Zeppelin
Alarm room	security system	Turn off alarm to Henry's room
Art room	vault	Contains a painting of the Grail
Guard A	stein	Can carry ale
Castle room 3	suit of armour	Get out of ropes when tied up with Henry
Castle room 13	loose brick	Whip across castle wall
Castle room 10	first aid kit	Restore health after fighting
Castle room 9	small uniform	Laundry key is in the pocket
Castle room 16	pass	Get Hitler to sign and sail past the checkpoint guards
Castle room 16	trophy	Fill with ale and give to Biff the Nazi
Castle room 17	silver key	Opens Henry's castle door
Castle kitchen	roast boar	Give to dog in Vogel's office
Castle kitchen	keg	Fill mug with ale
Castle hallway	wires	Wires connect alarm to Henry's room
Castle exterior	motorcycle	Take it to Berlin
Castle wall	brick	Use to whip across
Catacomb room 15	casket	Casket of dead Grail Knight
Catacomb room 12	wooden plug	Drain pool in catacombs
Catacomb room 12	inscription	Major clue to select correct Grail
Catacomb room 2	hook	Pull plug in catacombs
College hall	drinking fountain	Gee, I'm thirsty
College hall	trophy case	College pride

ITEM LOCATION	ITEM	USE
College hall	display	Lots of cool stuff
College hall	bulletin board	What's for lunch
Grail chamber	Holy water	Fill Grail with this to heal Henry
College gym	bell	Start the fight
College gym	mallet	Used to ring the bell
College gym	light switch	Turns off lights in gym
College gym	boxing ring	Practice boxing
College gym	locker room	Enter to change into boxing clothes
Henry's house	painting	Give to guard in castle
Henry's house	book case	A ball of tape is stuck to its back
Henry's house	sticky tape	Contains key to chest in Henry's house
Henry's house	chest	Contains fake Grail diary
Henry's house	old book	Give to Vogel when caught
Indy's inner office	junk mail	Hides Henry's Grail diary
Indy's inner office	Grail diary	Many useful clues
Castle laundry	servant uniform	Bluff past guards
Castle laundry	grey uniform	Bluff past guards
Library in Venice	stain glass window	Clue to the catacomb entrance
Library in Venice	red cordon	Use on strange machine as a pulley belt
Library in Venice	metal post	Use to pry up slab
Castle - many places	money	To buy ticket to Zeppelin, or bribe
Henry's pocket	coins	To pay the piano player
Manhole in catacombs	manhole	Get out of catacombs
Venetian Piazza	wine bottle	Fill with water to loosen torch
Zeppelin radio room	short-wave radio	Break it to gain time on Zeppelin
Zeppelin radio room	wrench	Used to lower ladder
Airport exterior	biplane	Fly to Temple and skip the Zeppelin

★ POCKET SIZED ★ PC-COMPATIBLE ★ PERSONAL ORGANISER ★



ATARI
Portfolio

THE PC
IN YOUR
POCKET

The new Portfolio from Atari is the world's first pocket-sized electronic organiser that is also a powerful PC compatible computer, with a full QWERTY keyboard and scrolling 80x25 character display.

Portfolio includes everything you would expect from an electronic organiser - an address and telephone book, time manager, diary and sophisticated calculator.

Portfolio also includes several functions that you would not expect - a spreadsheet for your personal budget and expense records, as well as a text processor for typing memos and letters.

And, because Atari's Portfolio is PC compatible, it can communicate with your desktop PC at home, or in the office. You can transfer files from one to the other, to enable you to update your reports and figures with the Portfolio while you are on the move.

FOR ONLY **£199** INC VAT

SPECIFICATION

- **Processor:** Intel 80C88 at 4.9152Mhz.
- **Operating System:** Compatible with MS-DOS 2.11.
- **Internal ROM:** 256K containing BIOS, operating system and applications suite.
- **RAM:** 128K with an internal RAM disk, configurable from 8K. Externally expandable to 640K RAM.
- **Keyboard:** 63 keys, QWERTY, IBM PC BIOS compatible. Buried numeric pad and function keys. Optional key click.
- **Character Set:** Extended IBM ASCII (255 characters).
- **Mass storage:** credit card sized memory cards (32K or 64K or 128K RAM).
- **Display:** Graphics LCD, supertwist technology, MDA compatible, 40 columns x 11 lines, 240 x 160 pixels (with the option to window a full 80 x 25 character display). Keyboard controlled contrast.
- **Peripherals:** 60 pin expansion BUS to take serial and parallel ports and memory expansion units.
- **Size:** 8" x 4" x 1" (200mm x 105mm x 29mm).
- **Weight:** 495 grammes (with batteries).
- **Applications:** calendar and diary, address and phone book, Lotus 1-2-3 compatible spreadsheet, text processor, communications software.

5 BUILT-IN APPLICATIONS! TO GET YOU ORGANISED!

To get you started, Portfolio comes with a suite of five useful functions built-in, accessible from a simple menu display.

TIME MANAGER

More than just an electronic diary, the Portfolio Time Manager enables you to plan your appointments via a comprehensive calendar and diary. It can even be programmed to sound an audible alarm at specific times to remind you of important appointments.

CALCULATOR

Your Portfolio will be invaluable in the office or at home as a powerful pocket calculator. It has a full range of functions, including factorial,

power and root calculations, all with multi display formats and memories.

ADDRESS BOOK & DIALLER

Portfolio has a complete address book facility that allows you to store hundreds of addresses and phone numbers. And, at the touch of a button, you can retrieve any one of them, or search for a specific grouping, such as "all Italian restaurants". And, when you are ready to book your table, hold your Portfolio to your telephone mouthpiece and use its special built-in tone dialler to dial the number for you.

TEXT PROCESSOR

The Portfolio's built-in text processor program

includes word wrap, line and column count, string search, in fact most of the functions you would find in a word processor. It handles printer and word processor control codes and allows easy transfer of files between Portfolio and your desktop PC.

SPREADSHEET

For real calculating power, Portfolio has a Lotus 1-2-3 compatible spreadsheet built-in. It has 127 columns x 225 rows and reads/writes Lotus V1.0 and V2.01 files, you can transfer data and from Lotus 1-2-3 on your desktop PC. The Portfolio's 256K ROM includes MS-DOS and PC BIOS compatible systems software.

COMING SOON!

In addition to the excellent software built-in the Portfolio Free of Charge (see right), other software and peripheral products, such as the sophisticated Pocket Finance package and serial/centronics interfaces are available. And it doesn't stop there. Many manufacturers have recognised the potential of the Portfolio and have already started to design new peripherals and software. Products currently under development include: Serial interface with built in mini modem, Apple Macintosh interface, business, utility and programming software plus a range of adventure and battle strategy games. For further free details on the Portfolio range, fill in the coupon below and return it to Silica Systems now.



MEMORY CARDS

Portfolio can store and retrieve data and programs from its own RAM, or from small credit card size memory cards, that slot into its built-in card drive. The cards are available in three sizes, 32K, 64K and 128K, so you can carry a library of data in your pocket. The card drive also accepts ROM cards, which can contain commercial or custom software.



POWER SUPPLY

Portfolio is powered by three AA batteries which will run for up to six weeks with normal use, or from the mains using an adaptor. All the peripherals take their power from the Portfolio, so no extra batteries or adaptors are required. A "battery-low" warning and memory back-up ensure that information is not lost when the batteries are changed.



INTERFACES & PERIPHERALS

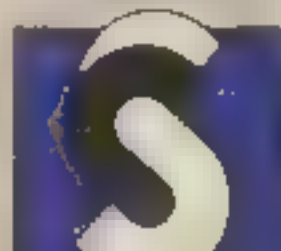
Portfolio can communicate with other computers and supports a growing range of peripherals via a built-in 60 pin bus connector. Peripherals available include serial and parallel interfaces and memory expanders (to 640K). You can also add a card drive to your desktop PC, enable it to read/write to Portfolio's cards.

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BATTLE COMMAND

Atari ST and Amiga • £24.99

If you've read the previews bit of Games Week, you'll have noted the re-emergence of *Carrier Command*, an old-time classic that first gave Realtime Designs III taste of fame and fortune. Now, after two years wait, its back again with *Battle Command*, an action-strategy game that uses the best of fantastic 3D vector technology.

You're behind the wheel (or should that be handles?) of a large, virtually impenetrable tank, known to its creators as the Mauler. It's a beast of a machine, and it makes the Challenger look like a Tonka toy. The phrase 'armed to the teeth' immediately springs to mind, and stays there! No less than 11 weapon types can be fitted to this mobile artillery platform, though not all at once. You have a Pulveriser cannon, surface-to-air and surface-to-surface missiles, mortars, mines, cluster bombs, skeets, flares, wire-guided missiles, lasers and chaff dispensers to play with, but don't spend all day admiring the kit – get on and play the game!

There are 15 preset missions in *Battle Command* and they're all very different. One might have you sitting on a hill waiting for a convoy to turn up and get blown to heck. Another has you charging down a railway track, wellying after a supply train, while another is just a gung-ho "the enemy's over the top of that hill" go get 'em affair. Each mission has its own briefing screen which displays all the objectives on a large easy-to-read map. These are worth close study as its very difficult to unravel the paperwork when enemy missiles are pouring down on your head.

Each mission begins with a classic opening scene, featuring you inside your Mauler, which is itself inside a large helicopter. You're deployed (ie bunged out without any option) whilst still airborne, and your Mauler floats to the ground like a brick, with a small Sinclair pocket handkerchief-cum-parachute opening up to break your fall. Then it's engines on, and head straight into trouble of some sort or another.

The mouse controls the Mauler's motion by moving forwards and backwards while weapons are under the control of the left button. Mastery can take a short while, but soon it becomes ingrained, which is just as well because you need quick and cunning responses if you are to avoid a terrible fate.

Battle Command is one of those games where you can have just as much fun watching the game being played as you can playing it yourself. The action is smooth, fast and incredibly detailed, featuring some

Be a tiger in your tank

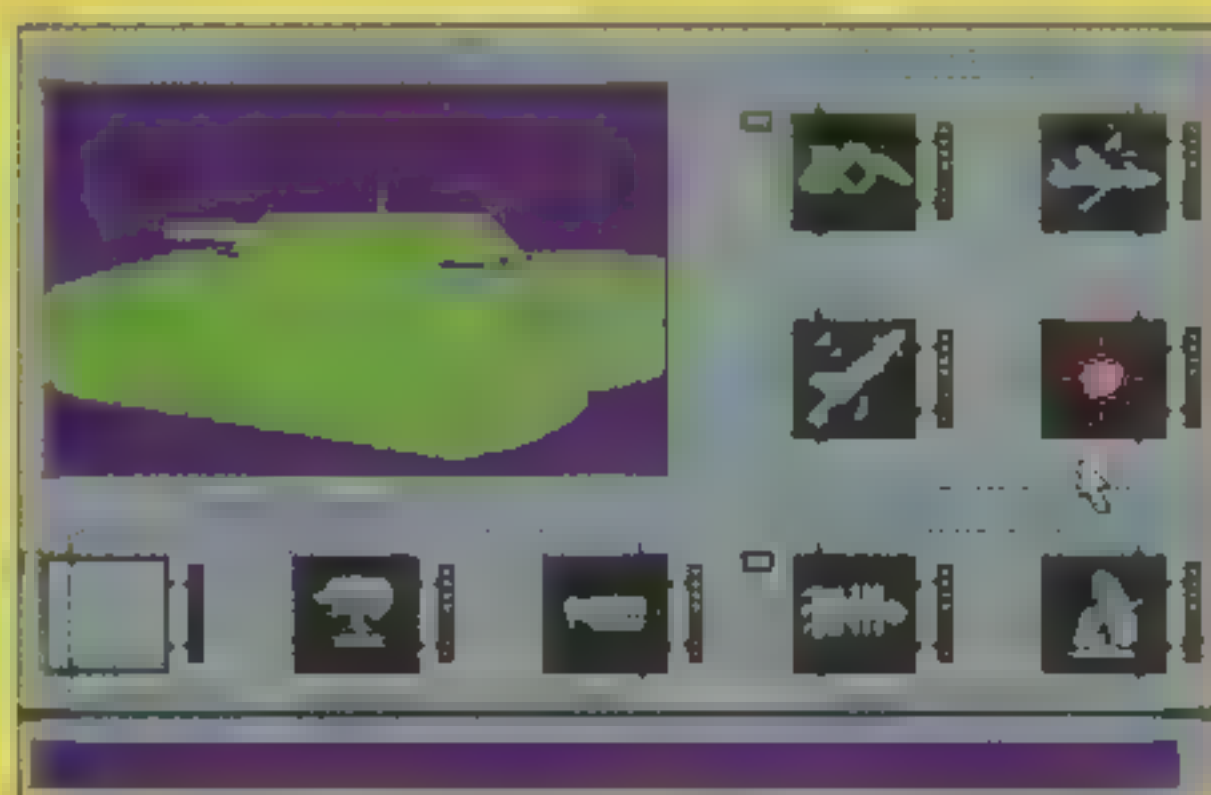


amazing 3D shapes, like trucks, refineries, the chopper and indeed, the Mauler itself. The perspective is just right, and it puts you right in the driving seat – as things loom up in front of you, you feel like you're really there.

Sound is not so wonderful, but heck, it makes very little difference to the gameplay. Usually this would let a game down, but for some reason it's not so important when the game itself is strong, as in *Battle Command*. The only time you really get to hear the sound effects is when you're under fire – and then you're usually too concerned with getting the hell outta there!

So, if the current situation in the Gulf has you champing at the bit for some action, you could do worse than end up in a Mauler. If the Gulf crisis has you cowering under the blankets, or worried sick, perhaps you'd better leave this one alone until its over. But even then, it's too good to miss, and this one is only make-believe after all.

MANAGING YOUR MAULER



• The damage screen shows the condition of your battle-worn machine.



• Each mission has its own map, with specific drop, attack and pickup points clearly marked.



• No less than 15 missions are displayed along with moving images of the targets.

CONSOLE
ZONE

SEGA MEGADRIVE

Try this *Populous* level select cheat: choose a New Game, hold down [B] and [Up] or [Down] to select a stage.

Have you got any hints for *Thunderforce III*, *Moonwalker*, *Strider*, *Golden Axe* or *Revenge of Shinobi*?

ATARI LYNX

Thanks to Nicholas Wells from Norfolk for this *Blue Lightning* hint: If you crash or are shot down, press [Up] and [A]. You continue instead of restarting the level.

Have you got any hints for *Rampage*, *Xenophobe* or *Ms Pacman*?

SEGA MASTER SYSTEM

Select any *Vigilante* stage by pressing [Upper Left] and any other button.

Have you got any hints for *Golden Axe*, *Ultima IV*, *Wonderboy III* or *R-Type*?

NEC PC ENGINE

Hear some *Moto Racer* tunes by placing MUSIC on the Entry Board.

Have you got any hints for *Gunhed*, *R-Type II* or *Splatter House*?

NINTENDO ES

To continue a *Rad Racer* track, wait for the demo screen, then hold down [A] and [Start].

Have you got any hints for *Super Mario Bros*, *Super Mario Bros 2* or 3?

NINTENDO GAMEBOY

Thanks to Dominic Brookman from Kenilworth in Warwickshire for this final instalment of *Golfing* hints: It's a good idea to press the [B] button once before taking long shots as you're given a view of the whole course (this often makes choosing the direction of your shot far easier). If you're stuck on one particular hole then return to the beginning and simultaneously push [Down] and [Start] on the title screen, you will now be in the training mode where you can iron out your problems. When in bunkers always use the sand wedge on full power or the ball will travel only a very small distance. Many greens have sharp slopes, so putt carefully! When on the edge of water hit a stronger shot than normal or the ball will land in it again.

Have you got any hints for *Ghostbusters II*, *Robocop*, *Batman*, *Contra* or *Chase HQ*?

ST'S IN BUSINESS

People's perceptions of what makes a standard PC change all the time. At any given moment different machines hold the posts of 'low-end PC', 'standard PC' and 'power PC'. For some while the standard PC award went to the 286-based AT type machines, with the low end championship going to 8086XTs and the power crown going to expensive 386s.

However, over the last year the ground has shifted. At the top end, 486 machines have reduced the street credibility of even a 33MHz 386 to zero: only a 486 is good enough, and already the 25MHz version of that chip is being looked at askance. Further down the scale, Intel introduced the 386SX chip, falling between the 286 and 386 in terms of power and price. These newcomers muscling into the market forced prices down to the point where anyone still buying a 8086-based PC has, to be generous, been getting some very poor advice from somebody.

So now the entry level machines are powered by 286 chips, with the processors running at 12MHz. For slightly more cash, however, there is a grey area in the market, filled by 286 and 386SX machines running at 16 and 20MHz with overlapping prices and specifications. So which is the best one to go for and why? To fully understand that we need to take a look at part of the PC's history.

In 1981, IBM invented the PC. It used a chip built by Intel called the 8086, and built the electronics of the motherboard so that it could shift data around 8 bits at a time. The Amstrad 1512 and 1640 were built to this specification. Later Intel developed a chip which could handle data 16-bits at a time, the 80286 or 286 for short, and IBM constructed a computer around it called the AT. Chip design continued apace, and Intel came up with the 386, which could handle data in 32-bit chunks - four times as much as the original PC. Soon PCs with motherboards which also shifted data 32 bits at a time appeared; unfortunately there was a problem. The expansion slots on a PC can only deal with 16 bits at a time, so that even though a microprocessor might be working in 32-bit mode, any data which has to get to anything on a card - say the monitor, hard disk or expanded memory card - it is still only able to travel in

POWER TO THE

Speed up your 80286 system by up to 300 per cent with the SOTA Express/386 accelerator. A credit card size 386 does not occupy the valuable space of an expansion slot in your system.

A 386SX PC now costs over a hundred pounds more than the equivalent 286. The difference between the two and assesses two upgrade boards for 286 owners.

16-bit chunks.

Aha, said Intel, most of our 386 chips aren't working anywhere near their capacity because of the 16-bit bus of the PC, so why don't we build a version of it which contains all the same clever silicon, but which communicates to outside world 16-bits at a time. Then manufacturers can build machines out of cheap 16-bit parts and still get most of the advantages of a 386. The chip it built was the 386SX, and when it was first announced hardly anyone could see the point of what was seen as an emasculated 386. But the early

doubters have been proved wrong with 386SX machines taking nearly a third of the PC market.

So then, 286 and 386SX machines have fundamentally the same 16-bit electronics but different processors, so what's the advantage of the 386SX as a processor? The plus points fall into two areas: multi-tasking and memory management.

To understand the 386SX's edge in multi-tasking also requires a bit of retrospective. As we've said the first PCs ran a 8086 chip, and still to this day the majority of programs use code written for the 8086. The

TAKING THE STEP TO THE 386

As we have seen, the basic electronics of a 286 and 386SX machine are fundamentally similar. Both shift data around 16 bits at a time and run at approximately the same speed. So it should be possible to upgrade a 286 to a 386SX simply by swapping the microprocessor. Unfortunately life is not quite so simple as the 286 and 386SX chips are not pin compatible.

One of the first solutions to this problem came from Intel itself. The InBoard PC and InBoard AT are full-length expansion cards which contain a real 32-bit 386 chip, which is linked to the motherboard processor socket via a cable. These devices had the major disadvantage that the processor sits on an expansion slot, slowing data interchange down to the speed of the expansion bus. To try and reduce this problem, the InBoards have a megabyte of 32-bit memory on the card. This makes them expensive, but if you want a real 386, or you want to upgrade an 8086-based PC then they are worth a look.

Considerably cheaper are devices

which simply slot into the 286 socket on the motherboard, replacing the 286 with a 386. We looked at two which are currently on the market, the Hypertec Hyper386SX and the SOTA Express/386.

Both devices look similar and operate in a similar way. They consist of small daughterboards, about two inches wide by three deep, which contain a 386SX chip as well as glue chips to make the device compatible with the 286 socket.

The SOTA card (pictured above) has more features. It contains a socket for a 387SX maths co-processor (neither card works with a 287, although both hope to have a version which does soon). It also has 16K of cache RAM, which means that its 386SX chip can run flat out at 16MHz most of the time even if the motherboard it attaches to is only 12MHz, and the cache also speeds up processing by cutting down memory access.

The Hypertec board is much simpler. It runs at whatever speed the motherboard operates at and just slots firmly into place. You don't need any

software; it's just plug and go.

The SOTA board requires a device driver to be installed before the caching feature will work, and more worrying is fiddly to install and feels insecure, as if it might pop out of its socket at any moment. In fact that happened several times. This is probably a feature of the plastic leaded chip carrier (PLCC) socket on the test motherboard; other types of socket seem more secure. SOTA supplies an extension cable if you can't get at the 286 socket properly, but using it prevented full-length cards being fitted in three of the PC's slots.

Neither card speeds up the PC much; in fact the Hypertec device actually slows it down somewhat, but you shouldn't buy devices like this for extra speed, but for the extra facilities of the 386. SOTA's packaging is being a little optimistic in claiming a 300 per cent speed increase, as you can see from the table.

Once fitted both cards allowed the PC to behave as a 386SX, and no software compatibility problems whatsoever were

encountered with either device. In the final analysis, the Hypertec board is easy to install and feels secure, and is a reasonable price. The SOTA board wins on performance alone, but is much fiddlier to install and even when in place does not inspire confidence, even with its higher price. You feel you can trust the Hypertec device more, and that's the board I'd buy.

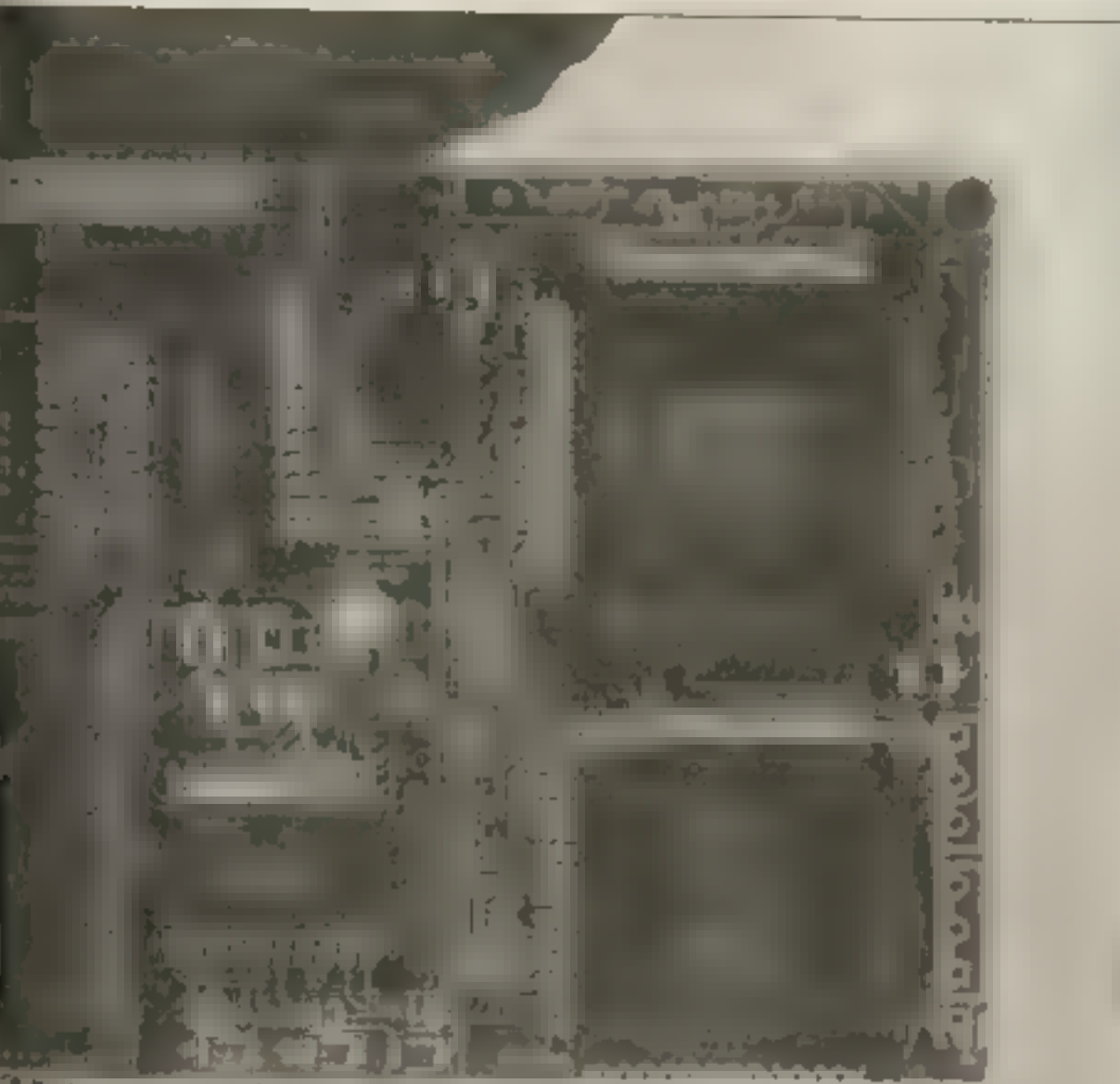
SOTA is distributed in the UK by CTS on 0235 559944. The Express/386 costs £499. A 20MHz version is available at £649.

Hypertec is on 0672 63936, the Hyper386SX costs £249.

SOME ROUGH BENCHMARKS

DEVICE	NORTON CI PC TOOLS PERFORMANCE RATING	
	(PC=1)	(PC=100%)
12 MHz 286	13.6	690%
Hyper386SX (12MHz)	11.2	515%
Express/386	18.4	925%
Express/386 no cache	8.6	340%

THE PC



286 machine. Stuart Anderton explains

386SX has the rather handy ability to pretend to be several 8086 chips simultaneously; as far as programs running on these 'virtual 8086's are concerned they are running on an ordinary 8086 machine over which they have complete control. In fact the 386 is darting around making sure all the input and output from the pseudo-8086 looks right to it. It can perform this juggling act with several virtual 8086s at a time, allowing several programs to be run simultaneously. The 386 makes quite sure that the programs are not badly behaved, by for instance accidentally deleting one of the other pro-

HOW THE CHIPS COMPARE			
INTERNAL	EXTERNAL	MEMORY USABLE	MAX SPEED
16-bit	8-bit	1Mb	12MHz
16-bit	16-bit	16Mb	25MHz
16-bit	16-bit	Gigabytes	20MHz
16-bit	32-bit	Gigabytes	33MHz
16-bit	32-bit	Gigabytes	33MHz

grams. This kind of hardware-protected multi-tasking is very different to the kind which relies on software to obey a set of rules and cordially hand over control of the machine to another program from time to time.

The other big advantage of the 386SX chip is its memory management. As far as a chip like the 286 is concerned a piece of memory's location is fixed by the wires which physically weld it to the motherboard. A particular part of memory always represents a certain chip. The 386SX is more sophisticated; it shields any programs running on it from the physical location of the memory and decides for itself exactly where in the chips to store data.

This means that the 386SX can make areas which do not in actuality contain any RAM appear to programs as if they do by 'mapping' memory into those locations from elsewhere. The programs have no idea that the memory they are writing to and reading from is in fact located somewhere else entirely. There might not seem a lot of point to this, but remember most MS-DOS programs are written to run on an 8086. The 8086 can only use the first megabyte of memory space, everything else is 'invisible' to it.

The same limit applies to MS-DOS and its programs - you can stuff the PC full of memory but it can only see the first megabyte. Unfortunately because of the way a PC is built a fair chunk of this megabyte is empty; no memory, no ROMs, just blank space. A 386SX can map memory from elsewhere into this space and then, with the aid of special software, DOS can use

it to store terminate-and-stay-resident programs, device drivers, disk buffers and other clutter which otherwise takes up valuable RAM which could be used for programs. DR-DOS, an alternative to MS-DOS, can even shift its own code into this otherwise empty space, leaving you much more room for other programs. Unfortunately you can't use this high memory for your main programs.

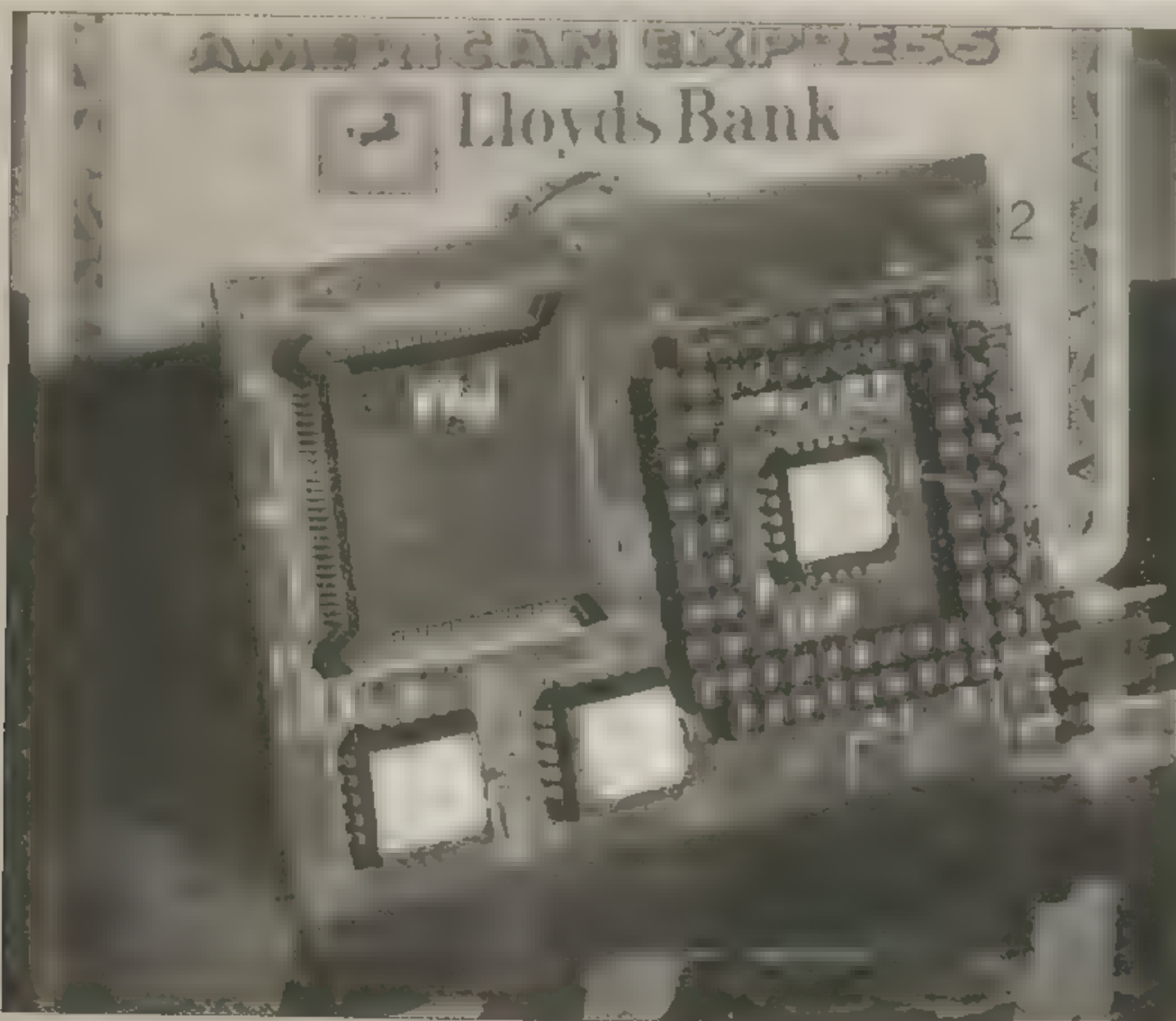
The first 640K of memory is reserved for programs and MS-DOS, and with a 386SX and the relevant software you can get up to 625K or so free of clutter for software to use. A 286 with a mouse driver and networking software can easily have less than 500K free, too little for some programs to run.

The 128K of space immediately above 640K is reserved for the graphics adapter, but some like CGA and Hercules don't actually use all the space, so a 386SX can extend the 640K upwards to 704K, and this extra memory can be used by programs. EGA and VGA adapters use all their allocated space, however, so you can't gain extra with them.

Another memory advantage of the 386SX is its ability, with the relevant software, to turn extended memory into expanded memory. As we've seen, MS-DOS is blissfully unaware of any memory above a megabyte, memory known as extended memory. However, this isn't enough for some programs, so a system called expanded memory was invented. This allocated a 64K space in the area under a megabyte, and then used special hardware to move this 'page frame' around the memory over one megabyte. DOS could then see the extra memory, but only the 64K which was 'under' the frame at the time. It wasn't an elegant solution (only data could be stored in expanded memory, and any data structure bigger than 64K caused problems), but it was better than having nothing. Many programs therefore support expanded memory, and a 386 can supply it without having to have the special hardware installed.

The combination of all these features and others has made the 386SX very popular with programmers. And that is the final, and most important, advantage of the 386SX. More and more software is now being written which has shed the confines of ordinary MS-DOS and actually requires a 386 chip. The classic example is Microsoft Windows 3. Hailed as the saviour of the PC, this easy-to-use graphical interface will work with virtually any processor, but only with a 386 does it come into its own. Then the 386s allows ordinary MS-DOS programs to run in a window. You can use hard disk space as if it were memory. And you can multi-task programs, even allocating how much time the PC is to spend on each one.

Increasingly it will be the case that the newest, flashiest and most interesting software will be 386-specific, so the 386SX wins out and is worth the extra hundred pounds. If you have a 286 already though, don't despair. There are two upgrades available which let you change your chip for a minimal cost, and they are reviewed elsewhere on this page. But if you are buying a new PC, go for a 386SX. ■



• The Hyper 386SX board for Windows 3.0 applications

SPREADSHEETS ON THE AMIGA

In the PC world the name *Lotus 1-2-3* is synonymous with the spreadsheet. Spreadsheets are not a new idea and *Lotus* was not the first spreadsheet, but by virtue of its power, not to mention some clever marketing, it has become a standard. A standard by which all spreadsheets are judged: a standard so popular that several Amiga packages boast compatibility with it.

But what exactly is a spreadsheet and why do business people spend hours tinkering with them? *Collins' English Dictionary* defines a spreadsheet as "a computer program that allows easy entry and manipulation of text and formulae, used especially for financial planning and budgeting." While this sums up their main uses, it does little to describe how spreadsheets work – and how powerful modern variants are.

Early spreadsheets were devised to assist with financial planning, so their design closely follows that of a bare sheet used for cashflow projections and profit forecasting. A simple cashflow is defined as follows:

- 1) Draw a grid of 40-50 rows, 15-20 columns.
- 2) Along the top fill in twelve months of the year.
- 3) Down the left-hand column make a list of items creating income, followed by items of expenditure, leaving blank rows for headings and results.
- 4) For the year, fill in the projected amount expected to be earned by or expended on each.
- 5) For each month, add together all items of income and enter this figure below the list of incomes. Call this A.
- 6) Do the same with expenditures. Call this B.
- 7) For the first month subtract "B" from "A" (income over expenditure) and call the result "C" (balance over).
- 8) For the rest of the year calculate "A - B" and add result "C" from the previous month.
- 9) At the end of each month and the end of the year, the result shows the projected gain or loss.

It is easy to see therefore, calculating even a simple cashflow analysis can involve hundreds of calculations before arriving at an end result; and a small change of a single figure can mean the entire sheet has to be recalculated. This is a very time-consuming business especially when the forecast has to take into account many variables: market trends, regional sales variations, variable interest rates and so on.

MAKING MONEY EASIER

This is where spreadsheets come in. Computers are brilliant number-crunchers and cashflow forecasts represent an everyday business problem. Using a spreadsheet, a businessman can accurately predict what will be happening to his profit margins in one, two or more years' time. Variables, such as interest rates, can be adjusted at any point and the entire sheet recalculated in a matter of seconds. Correct use of cashflows can prevent bankruptcy or insolvency by helping to identify possible problems before they arise.

More powerful Amiga packages now also incorporate facilities for simple database applications, word

Spreadsheets are the answer to all businessmen's prayers. Damien Noonan explains why and checks out some of the best spreadsheet packages around.

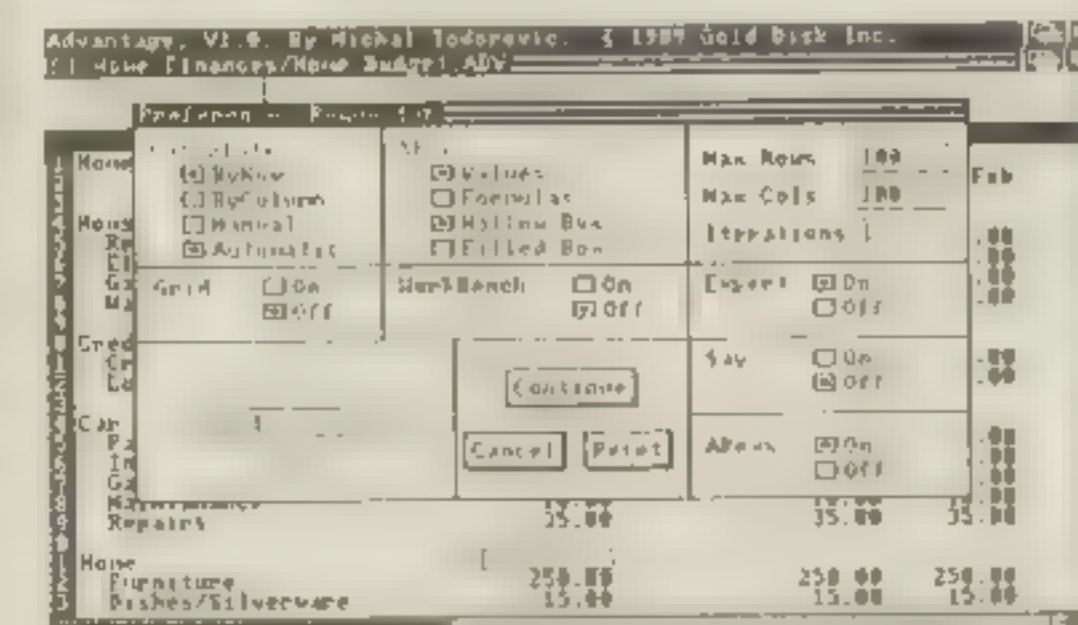


processing and, more recently, project planning. Also, following the cliché 'a picture tells a thousand words', most packages have the ability to produce graphs based on worksheet data.

THE SOFTWARE



Superplan (Grafox £99.95) comes from the database masters. Precision Software's subsidiary Grafox, so one could reasonably expect it to be an impressive productivity tool. It is powerful – and unique among current Amiga spreadsheets in that it incorporates Time Management (or Project Planning) facilities. *Superplan* can even load alien files from *Lotus* and *dBase II & III*, in addition to Logistix, CSV, DIF and ASCII text. It can be remotely controlled from *ARexx* making it compatible with *Superbase Professional*. But it is slow and quirky.



Advantage (Gold Disk £99.95) has a wicked turn of speed. Notable also is the Intuition interface which conforms stringently to Commodore's guidelines. Also worth a mention is its ability to import files from *MaxiPlan* and *Lotus*. It is difficult to find fault with *Advantage*. Gold Disk has taken the best features from the best packages and incorporated them into one bumper bundle. In trials it was the most consistent and most stable of all packages tested. Although it lacks "fancy" features, *Advantage* sets standards of friendliness and speed by which others should be judged.

DGCalc (Digita International £39.95) has the distinction of being the cheapest (and therefore the simplest) Amiga spreadsheet. There is at least one offering in the Public Domain but it lacks documentation, which is where *DGCalc* scores most highly considering it is ostensibly a very limited package. The 40-page manual is perfect reading for beginners. This is a basic package which makes do with an absolute minimum of functions, but is nevertheless quite capable. Ideal for beginners although most users will quickly outgrow it.

Analyse 2 (Micro Systems Software £49.95) has now joined several bundles, but can still be bought separately. It has some excellent – if at times quirky – facilities. Of the cheaper packages it is the only one capable of loading and saving *Lotus 1-2-3* files. Making *Analyse* unique among the budget systems is its ability to plot a wide range of graphs, in either four or eight colours, as well as saving to an IFF file. In itself this makes the package a real pleasure to use. *Analyse* is now supplied with *The Works* (price £99.99) and can freely exchange data with other packages supplied therein it is very hard to beat.

K-Spread 2 (Kuma £59.95) is another entry-level spreadsheet. It offers far more features, at least a token offering of graphics capability, and more comprehensive documentation. Like most of Kuma's business products *K-Spread* has a definite Atari ST look about it. *K-Spread 2* affords good value for money and a businesslike feel. Although it does not support *Lotus WKS* files it can load and save in Data Interchange Format so it is compatible with other Kuma products. Graphs can be saved as IFF pictures for import into graphics and DTP packages.

MaxiPlan Plus (Intuitive Technologies Price N/A) comes with the Amiga Class of the 90's bundle, so might be expected to be lacking in power or facilities. Nothing could be further from the truth, although it must be stated from the outset that *MaxiPlan* lacks the stability necessary for an educational environment: graphics operations in particular are very prone to Gurus. All the same, it is one of the most powerful and flexible spreadsheets available. Certainly a lot of thought has been put into the user interface. *MaxiPlan* is the lazy man's dream: every conceivable function, with the exception of text, can be input without touching the keyboard.

K-Spread 3 (Kuma, Price under £100) is the newest on the market. Although based on a GEM-like interface, it does look like a force to be reckoned with. Kuma claims that although the package supports *Lotus*, it is modelled more closely around Microsoft's *Excel* – for the Macintosh – which is far more powerful and more up-to-date than *Lotus*.



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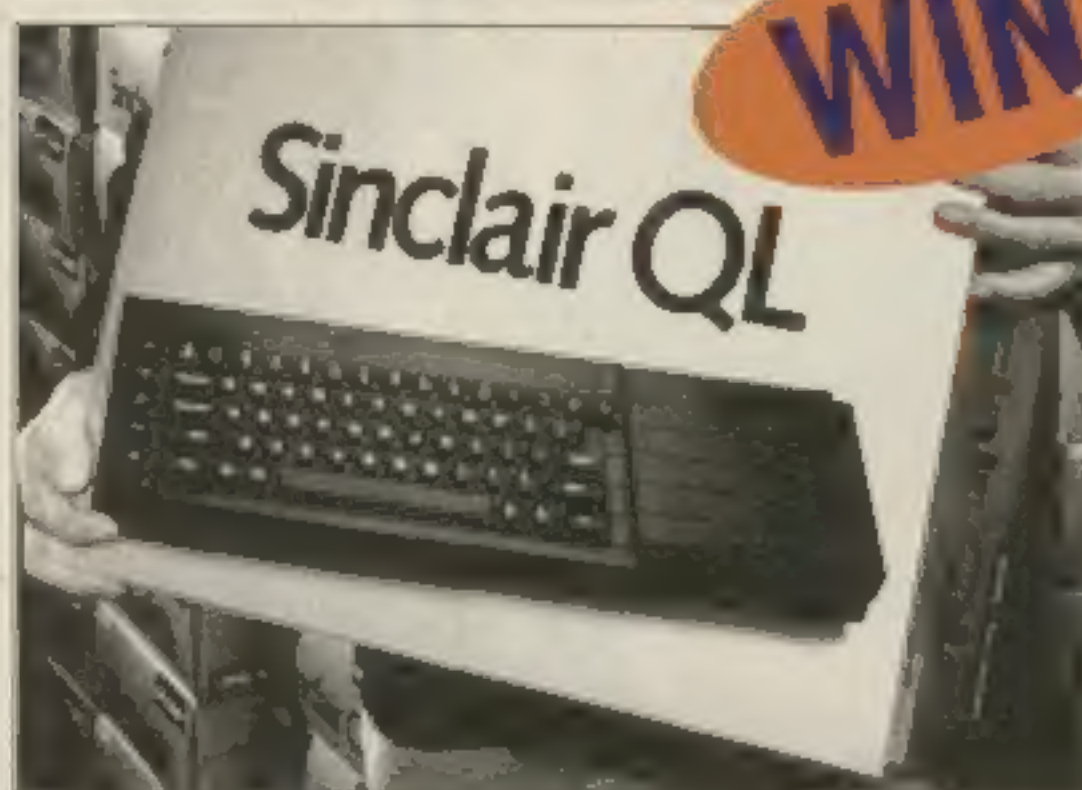


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The QL has the 68008 as its main processor and comes with spreadsheet, database, word processor and art applications programs. It can also support multi-tasking. While the QL is no longer on the shelves of computer stores, it's still available from EEC Ltd.

If you already have a QL or if you're lucky enough to win this competition and you want to upgrade you can speak to EEC on 0753 888866. And that's not all. Quanta, the QL user group supports and is supported by 5,000 QL users worldwide.

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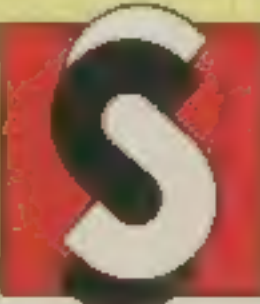
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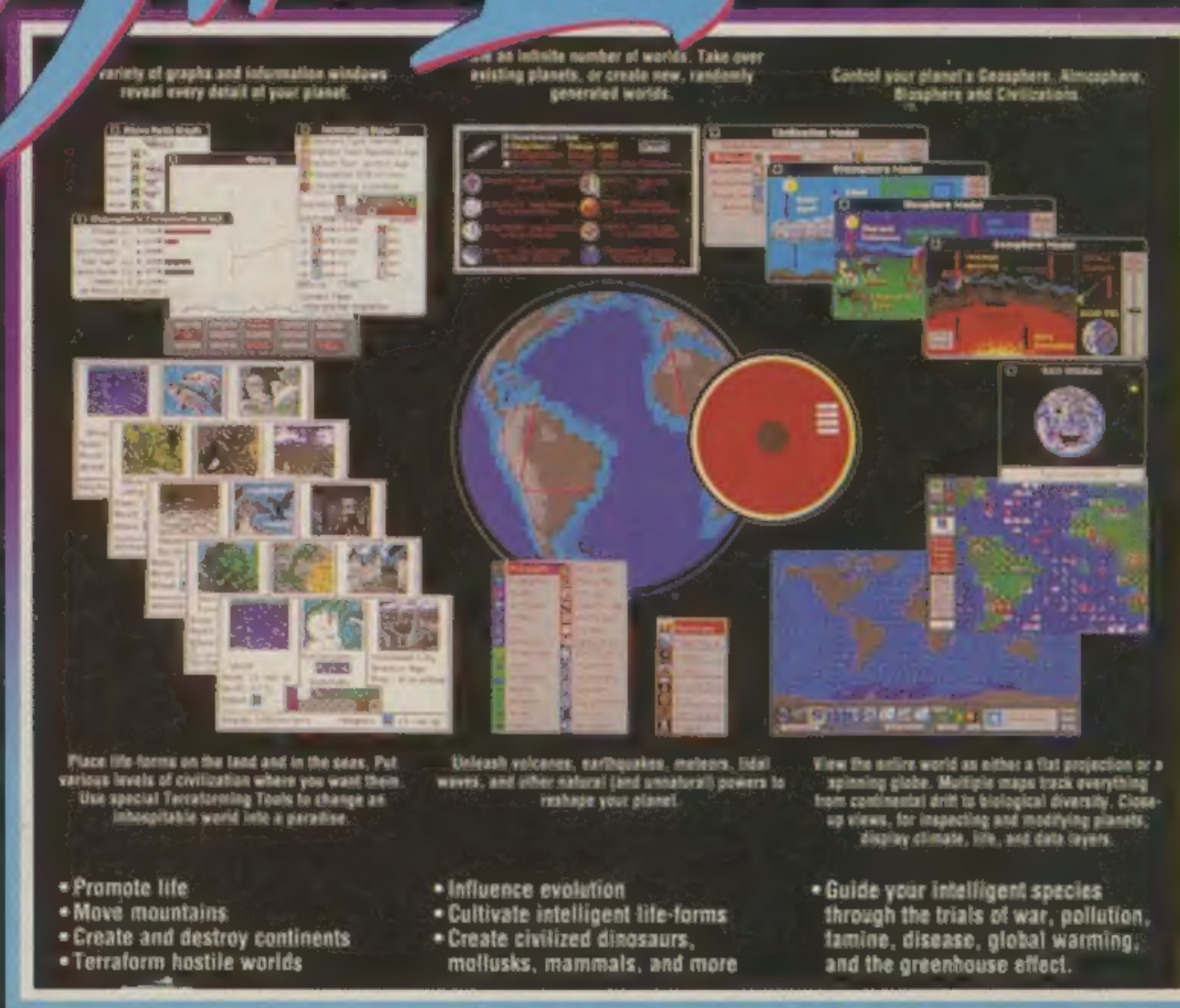
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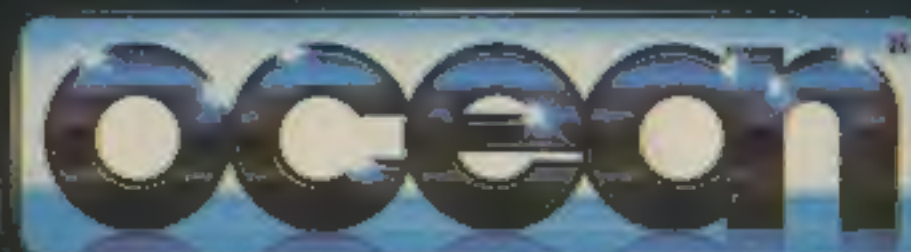


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